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ABSTRACT

These sample problems, exercises, questions, and projects were compiled to supplement the guide for the Manitoba course Mathematics 301 in order to assist teachers in implementing the program. Arranged according to the modules of the course guide, they are coded to the objectives of the program. Review exercises follow either the subtopics within a module or the entire unit. Answers for all exercises are provided at the end of each unit. Exercises are provided for both core topics and optional topics. Core topics are: consumer mathematics (budgeting, taxation, insurance, mortgages), algebra (algebraic operations, equation solving, graphing, variation), trigonometry, and statistics. Optional topics are annuities, depreciation and distribution of overhead costs, digital logic, investments, interpretation of graphs, quadratic equations, permutations and combinations, and statistics (standard deviation, normal curve). (MNS)

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curriculum support series

exercises to accompany

mathematics 301

province of manitoba

department of education 1984

SE 045 391

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EXERCISES TO ACCOMPANY MATHEMATICS 301

Manitoba Department of Education

1984

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USE OF THE DOCUMENT

INTRODUCTION

Because of the extensiveness of the course outline for Math 301, schools would have to purchase several different textbooks in order to cover the material adequately. Therefore, these exercises have been compiled to supplement the guide and to assist the Mathematics 301 teachers in implementing the new program. This series of sample exercises, questions and projects was prepared in 1982 and revised in 1983.

FORMAT

The exercises, projects and reviews contained in this package are keyed to the Mathematics 301 portion of the Mathematics 304, 301, 300 Interim Guide (1984). Arranged according to the modules of the guide, they are coded in the left-hand margin to the objectives of the Math 301 program. Review exercises follow either the subtopics within each module or the entire unit. Answers for all exercises are provided at the end of each unit to assist both students and teachers. Where necessary, blank forms pertaining to the exampies under consideration have been provided for teacher use.

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C.1. CONSUMER MATHEMATICS (2 1/2 MODULES)

A. BUDGETING

1. Dean Charles, an assistant elevator agent, receives a weekly salary of $595.00. After all deductions, his net weekly salary is $445.25. His wife receives a monthly family allowance cheque for their three children which amounts to $26.93 per child. Their expenses are: mortgage payments of $525 per month; payments on a new car of $213.50 per month, property taxes of $725 per year; life insurance on which he pays $60 every three months; hydro which averages $80.00 per month; telephone which averages $10.40 per month, car insurance of $240 a year; home insurance premium of $180 a year; food which averages $425 per month; clothing which averages $725 per year; entertainment $250 per year; Christmas spending $630 per year; newspapers and periodicals $65 per year; car maintenance $340 per year; gas and oil $80 per month. Prepare a monthly budget for the Charles family for the month of September.

2. Charlie and Bonny Wood are both employed. Bonny is a nurse receiving a weekly salary after deductions of $391.82. Charlie is a loans officer receiving a net weekly salary of $381.42. They have four children. Bonny receives a monthly family allowance cheque of $107.72. Their expenses are: a first mortgage on their home with monthly payments of $531.50; a second mortgage with monthly payments of $201.65; payments on a new car of $237.75 per month; hydro which averages $200 per month; telephone $20.20 per month; life insurance policy of $90.60 every three months; home insurance based on a home value of $60 000 at $0.42 per $100; their $60 0000 home is assessed at $20 000 for tax purposes (the mill rate is 98 mills); car insurance of $310 per year; food averages $740 per month; clothing averages $1200 per year; car maintenance $460 per year; gasoline which averages $140 per month; an average monthly credit card payment of $200; entertainment averages $160 per month; an average saving of $180 per month for their summer vacation; newspapers and periodicals $102 per year. Prepare a monthly budget for the Wood family for the month of August.

3. Erika and Tom Elsimatesky have 2 children and live in rural Manitoba. Erika is employed with Camair and nets $301.60 per week. Tom is employed with No-Stud Const. Co. Ltd. as a district manager and nets $310.50 per week. Erika receives the monthly family allowance cheques, which amount to $26.93 per child. Their expenses include: monthly mortgage payments of $725.60; monthly automobile payments of $186.40; telephone which averages $11.30 per month; hydro which averages $225.00 per month; car insurance policy with a premium of $337 a year; homeowner's insurance policy on their $50 000 home at a rate of $0.62 per $100; the family home is assessed for tax purposes at $15 000 and the mill rate is 122 mills; life insurance premium of $120 paid half-yearly; a payment of $130 a month on a boat; clothing averages $650 per year; groceries average $525 per month; gasoline $100 per month; entertainment $360 per year; vacation $940 per year; car maintenance $560 per year; Christmas savings $480 per year; babysitter (full-time) $196 per month; subscriptions for newspapers and periodicals of $84 per year. Prepare a monthly budget for the Elsimatesky family for the month of May.

4. Tony Hill earns $335.75 net per week. His wife, Natalie, earns $337.75 net per week. The Hills receive a monthly family allowance of $26.93 per child for their two children.

Their expenses include:

- Monthly mortgage payment	$715.40
- Monthly automobile payment	206.10
- Homeowner's insurance policy for year	149.40
- Total utilities for month	305.20
- Telephone (average per month)	12.50
- Property taxes $10 000 assessment at a mill rate of 120 mills	
- Food (average per month)	560.00
- Car insurance (year)	303.00
- Loan repayment (per month)	62.80
- Car maintenance (average per month)	35.00
- Gasoline (average per month)	92.00
- Clothing (per year)	830.00
- Entertainment (per year)	2600.00
- Vacation (per year)	900.00
- Special holidays (per year)	480.00
- Magazine and newspaper subscriptions (per year)	102.00
- Babysitter (per year)	364.00

Prepare a monthly budget for the Hill family for the month of March.

5. Dennis Murray earns $18 500 per year, which, after deductions, provides him with a monthly cheque of $1077.33. His wife earns a take-home pay of $248.56 a week. The Murrays have one child for whom Mrs. Murray receives the family allowance cheque. Family allowance for the year amounts to $323.16. The Murrays have recently bought a home, on which they are making mortgage payments of $425.00 per month and monthly payments of $165.00 on a three-year bank loan that helped to finance the purchase. Taxes are $730.00 a year; gas heat is estimated at $740 a year; electricity and water bills are approximately $83.50 for a two-month period; the telephone bill averages approximately $10.50 a month; house insurance is $242.00 a year. The Murrays are making payments of $180.00 per month on a one-year loan they made to finance the purchase of furniture. Insurance on the car costs $288 per year; gasoline averages $105 per month. Additional expenses include: food $420 per month; clothing $795 per year; entertainment $330 per year; Christmas spending $165 per year; newspapers, books and magazines $125 per year; car maintenance $255 per year; vacation $850 per year. Prepare a monthly budget for the Murray family for the month of April.

6. Bob Sampson, an insurance adjuster, has a monthly take-home pay of $1535.00. His wife, Eleanor, a teacher, has a monthly take-home pay of $1547.00. The Sampsons have no children. Their fixed expenses include:

- A home on which they are making mortgage payments of $715.00 per month
- Payments on a car of $212 per month
- Average monthly telephone bill $15.20
- Average monthly hydro bill $43.00
- Average monthly natural gas bill $49.00
- Yearly car insurance premium $368.00
- Yearly life insurance premium $360.00
- Yearly home insurance on a $60 000 home at a premium rate of $0.50 per $100 of insurance
- Property taxes on the home; the home is assessed for property tax purposes at $12 000 and the mill rate is 86 mills
- A fixed deposit of $100 per month into a Registered Retirement Savings Plan (RRSP)

The Sampsons estimate their variable expenses to be:

- Groceries $420 per month
- Clothing $960 per year
- Car maintenance $600 per year
- Gasoline $150 per month
- Entertainment $2400 per year
- Vacation $1800 per year
- Newspapers and periodicals $150 per year

Prepare a monthly budget for the Sampson family for the month of November.

7. Bill McConnell, a bank manager, has a weekly take-home pay of $350.00. His wife, Sandra, is employed as a computer analyst and has a weekly take-home pay of $344.00. The McConnells receive a monthly family allowance cheque of $80.79 for their three children.

Their fixed expenses include:

- A home on which they are making mortgage payments of $612.25
- Payments on a car of $310.00 per month
- Average monthly telephone bill $13.80
- Average monthly hydro and heating bill $90.00
- Yearly car insurance premium $356.00
- Yearly life insurance premium $480.00
- Yearly home insurance on a home at a premium rate of $0.48 per $100 of insurance
- Property taxes on the home which is assessed for property tax purposes at $11 000. The mill rate was 98 mills
- A monthly payment of $150 for their tent trailer

The family estimates its variable expenses to be:

- Food	$475 per month
- Clothing	$2500 per year
- Car maintenance	$500 per year
- Gasoline	$120 per month
- Entertainment	$1800 per year
- Vacation	$2400 per year
- Newspapers and periodicals	$160 per year
- Baby-sitters	$30 per month
- Average credit card debt	$40 per month

Prepare a monthly budget for the McConnell family for the month of October.

B. TAXATION

Exercises on taxation are provided in the Teacher's Manual - Teaching Taxes (Revenue Canada). These booklets are distributed nation-wide. To accommodate all provinces, the tax tables provided in the Workbook do not correspond exactly to the actual Manitoba situation and, therefore, they should not be used when filing an income tax return with Revenue Canada, Taxation.

Included in this package are 5 additional questions.

Note: In all situations where a family claims the Child Tax Credit the mother is required to complete an individual tax return with a Schedule 10 (Child Tax Credit).

No answers have been provided for these questions because of the varying tax rates from year to year.

Students should complete the Manitoba Tax Credit forms where necessary.

Income Tax

1. The purpose of this problem is to review the basic principles of the Math 201 course and to explain how all could fill out an individual tax return in the event a return is being filed this year.

   Wayne Smith is a secondary school student who lives at Box 1345, Dresdon, MB. He was born November 10, 1967. Wayne works part-time at the local co-operative.

   Complete Wayne's tax return, using the information provided in the attached T4 slip.

   Note: - Wayne received $205.00 interest from the Manitoba Hills Credit Union as shown on his T5 slip.

   - Wayne lived at home and is therefore not eligible for the Manitoba Property Tax Credit.

   - People under the age of 18 are not required to contribute to the Canada Pension Plan.

Revenue Canada Taxation | Revenu Canada Impôt

T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN / QUEBEC PLAN	(E) U I PREMIUM	(F) REGISTERED PENSION PLAN CONTRIBUTION	(G) INCOME TAX DEDUCTED	(H) U I INSURABLE EARNINGS	(I) C P P CONTRIBUTORY EARNINGS *	(J) EXEMPT CPP QPP UI
→ $3600 00		42 60	0	51 10	3600 00	0	0
GAINS TOTAUX AVANT DÉDUCTIONS	DU CANADA / DU QUÉBEC COTISATION DE PENSION (EMPLOYÉ)	PRIME DA-C	CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	IMPÔT SUR LE REVENU DÉDUIT	GAINS ASSURABLES A-C	GAINS COTISABLES POUR R P C *	RPC RRQ A-C EXONÉRATION

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (H), (I), (K) AND (L)	(K) TAXABLE ALLOWANCES AND BENEFITS	(L) EMPLOYMENT COMMISSIONS	(M) PENSION PLAN REGISTRATION NUMBER
	0	0	0
LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (H), (I), (K) ET (L)	ALLOCATIONS ET PRESTATIONS IMPOSABLES	COMMISSIONS D'EMPLOI	Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS

* If different from Box (C) - S'ils sont différents de la Case (C)

(A) PROVINCE OF EMPLOYMENT PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER Nº D'ASSURANCE SOCIALE	(N) EMPLOYEE NO Nº DE L'EMPLOYÉ
MANITOBA	403 316 231	106

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en majuscules), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

→

SMITH, WAYNE
BOX 1345
DRESDOON, MB.
R9G 929

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

Manitoba CO-OP
DRESDON, MB

- Attach to your 1981 Income Tax Return SEE INFORMATION ON REVERSE
- Annexer à votre déclaration d'impôt sur le revenu de 1981 VOIR LES RENSEIGNEMENTS AU VERSO

2

Revenue Canada Taxation | Revenu Canada Impôt

T5
Supplementary – Supplémentaire
Rev. 81

STATEMENT OF INVESTMENT INCOME
ÉTAT DES REVENUS DE PLACEMENT

Dividends from Taxable Canadian Corporations
Dividendes de corporations canadiennes imposables

Year ▶	(A) Actual Amount of Eligible Dividends	(B) Taxable Amount of Eligible Dividends	(C) Federal Dividend Tax Credit	(D) Eligible Interest from Canadian Sources	(I) Capital Gains Dividends	(J) Gross Foreign Income
				$205		
	Montant réel des dividendes admissibles	Montant imposable des dividendes admissibles	Dégrèvement fédéral pour dividendes	Intérêt admissible de sources canadiennes	Dividendes sur gains en capital	Revenus étrangers bruts
▶	(E) Actual Amount of Ineligible Dividends	(F) Taxable Amount of Ineligible Dividends	(G) Royalties from Canadian Sources	(H) Other Income from Canadian Sources	(K) Foreign Tax Paid	
Année	Montant réel des dividendes non admissibles	Montant imposable des dividendes non admissibles	Redevances de sources canadiennes	Autres revenus de sources canadiennes	Impôt étranger payé	

RECIPIENT: SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE: NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

→

SMITH, WAYNE
BOX 1345
DRESDON, MB.
R9C 929

Social Insurance Number Numéro d'assurance sociale
403 316 231

NAME AND ADDRESS OF PAYER (Must appear on each slip)
NOM ET ADRESSE DU PAYEUR (À inscrire sur chaque feuillet)

MANITOBA
CREDIT UNION
DRESDON, MB.

- For Recipient - Attach to your Income Tax Return SEE INFORMATION ON REVERSE
- Pour le bénéficiaire - Annexer à votre déclaration d'impôt sur le revenu VOIR LES RENSEIGNEMENTS AU VERSO

2

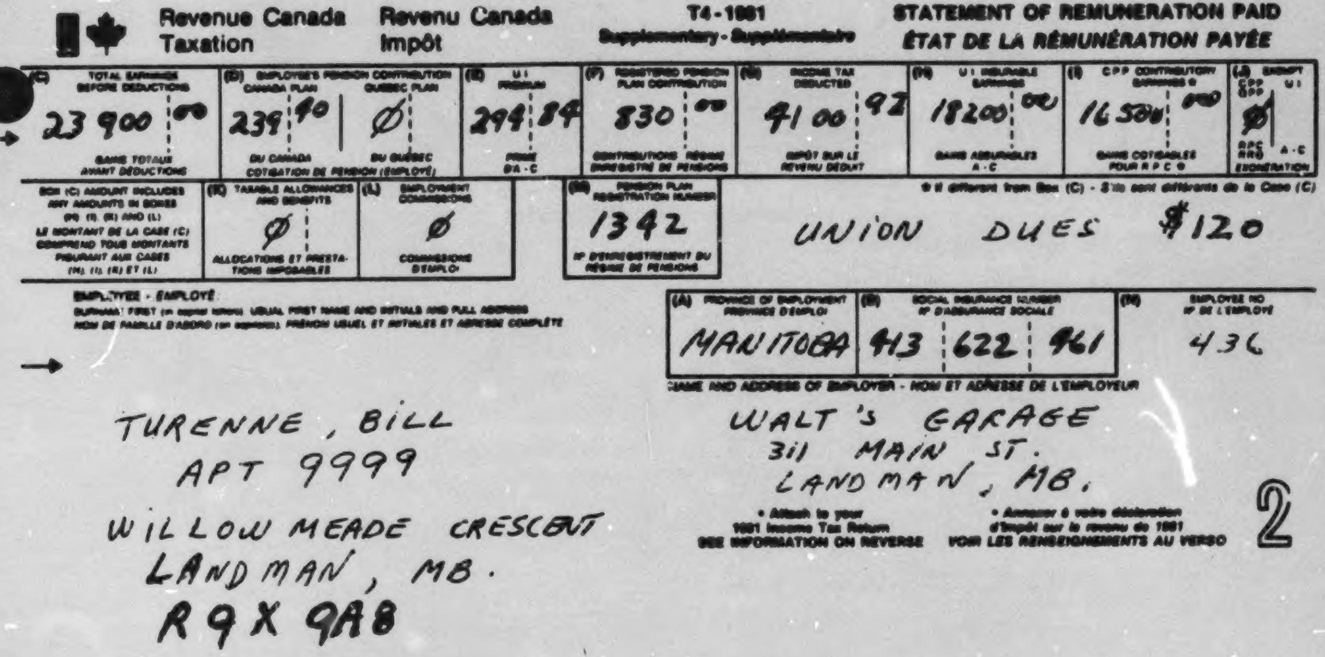
BEST COPY

2. Bill and Susan Turenne are a young married couple with no children. Bill works as a mecnanic in a garage (see his attached T4 slip). Susan works as a clerk at the Manitoba Public Insurance Corporation (see her attached T4 slip).

   Bill contributed $1000 in a Registered Retirement Savings Plan and also contributed $1000 into a Registered Home Ownership Savings Plan.

   Bill and Susan pay rent of $450 a month on an apartment. Bill will claim the Manitoba Property Tax Credit on his return. The Manitoba Cost of Living Tax Credit will be claimed jointly on Bill's return.

   Using the T4 and T5 slips provided, prepare separate returns for both Bill and Susan.



Revenue Canada Taxation **Revenu Canada Impôt**

T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS / GAINS TOTAUX AVANT DÉDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN / DU CANADA	QUEBEC PLAN / DU QUÉBEC	(E) U I PREMIUM / PRIME D'A-C	(F) REGISTERED PENSION PLAN CONTRIBUTION / CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	(G) INCOME TAX DEDUCTED / IMPÔT SUR LE REVENU DÉDUIT	(H) U I INSURABLE EARNINGS / GAINS ASSURABLES A-C	(I) CPP CONTRIBUTORY EARNINGS * / GAINS COTISABLES POUR R P C *	(J) EXEMPT CPP QPP / RPC RRQ, U I / A-C, EXONÉRATION
23 900 00	239 40	0	294 84	830 00	4100 92	18200 00	16 500 00	0

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (H), (I), (K) AND (L) / LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (H), (I), (K) ET (L)	(K) TAXABLE ALLOWANCES AND BENEFITS / ALLOCATIONS ET PRESTATIONS IMPOSABLES	(L) EMPLOYMENT COMMISSIONS / COMMISSIONS D'EMPLOI	(R) PENSION PLAN REGISTRATION NUMBER / N° D'ENREGISTREMENT DU RÉGIME DE PENSIONS
	0	0	1342

* If different from Box (C) - S'ils sont différents de la Case (C)

UNION DUES $120

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en majuscules), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

TURENNE, BILL
APT 9999
WILLOW MEADE CRESCENT
LANDMAN, MB.
R9X 9A8

(A) PROVINCE OF EMPLOYMENT / PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER / N° D'ASSURANCE SOCIALE	(N) EMPLOYEE NO / N° DE L'EMPLOYÉ
MANITOBA	413 622 961	436

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

WALT'S GARAGE
311 MAIN ST.
LANDMAN, MB.

• Attach to your 1981 Income Tax Return
SEE INFORMATION ON REVERSE

• Annexer à votre déclaration d'impôt sur le revenu de 1981
VOIR LES RENSEIGNEMENTS AU VERSO

2

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T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN	QUEBEC PLAN	(E) U I PREMIUM	(F) REGISTERED PENSION PLAN CONTRIBUTION	(G) INCOME TAX DEDUCTED	(H) U I INSURABLE EARNINGS	(I) C P P CONTRIBUTORY EARNINGS *	(J) EXEMPT CPP QPP U I
→ 14 500 00	239 40	0	294 84	350 00	2607 70	14500 00	14 500 00	0
GAINS TOTAUX AVANT DÉDUCTIONS	DU CANADA COTISATION DE PENSION (EMPLOYÉ)	DU QUÉBEC	PRIME DA - C	CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	IMPÔT SUR LE REVENU DÉDUIT	GAINS ASSURABLES A - C	GAINS COTISABLES POUR R P C *	RPC RRQ A - C EXONÉRATION

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (H), (I), (K) AND (L) LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (H), (I), (K) ET (L)	(K) TAXABLE ALLOWANCES AND BENEFITS	(L) EMPLOYMENT COMMISSIONS	(M) PENSION PLAN REGISTRATION NUMBER
	0	0	41324
	ALLOCATIONS ET PRESTATIONS IMPOSABLES	COMMISSIONS D'EMPLOI	Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS

* If different from Box (C) - S'ils sont différents de la Case (C)

UNION DUES $240

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en capitales), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

→

TURENNE, SUSAN
APT 9999
WILLOW MEADE, CRESCENT
LANDMAN, MB.
R9 X 9 A8

(A) PROVINCE OF EMPLOYMENT PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER Nº D'ASSURANCE SOCIALE	(N) EMPLOYEE NO Nº DE L'EMPLOYÉ
MANITOBA	213 263 512	14133

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

MANITOBA PUBLIC INSURANCE CORPORATION
SUITE 7777
411 MINTAGE AVE.
LANDMAN, MB.

• Attach to your 1981 Income Tax Return
SEE INFORMATION ON REVERSE

• Annexer à votre déclaration d'impôt sur le revenu de 1981
VOIR LES RENSEIGNEMENTS AU VERSO

2

Revenue Canada Taxation | Revenu Canada Impôt

T5
Supplementary - *Supplémentaire*
Rev. 81

STATEMENT OF INVESTMENT INCOME
ÉTAT DES REVENUS DE PLACEMENT

	Dividends from Taxable Canadian Corporations Dividendes de corporations canadiennes imposables					
Year	(A) Actual Amount of Eligible Dividends	(B) Taxable Amount of Eligible Dividends	(C) Federal Dividend Tax Credit	(D) Eligible Interest from Canadian Sources	(I) Capital Gains Dividends	(J) Gross Foreign Income
▶				503.20		
	Montant réel des dividendes admissibles	Montant imposable des dividendes admissibles	Dégrèvement fédéral pour dividendes	Intérêt admissible de sources canadiennes	Dividendes sur gains en capital	Revenus étrangers bruts
	(E) Actual Amount of Ineligible Dividends	(F) Taxable Amount of Ineligible Dividends	(G) Royalties from Canadian Sources	(H) Other Income from Canadian Sources	(K) Foreign Tax Paid	
▶						
Année	Montant réel des dividendes non admissibles	Montant imposable des dividendes non admissibles	Redevances de sources canadiennes	Autres revenus de sources canadiennes	Impôt étranger payé	

RECIPIENT: SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE: NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

→

TURENNE BILL
APT, 9999
WILLOWMEADE CRESCENT
LANDMAN, MB.
R9X9A8

Social Insurance Number Numéro d'assurance sociale		
413	622	461

NAME AND ADDRESS OF PAYER (Must appear on each slip)
NOM ET ADRESSE DU PAYEUR (À inscrire sur chaque feuillet)

HOMESTEADERS BANK
TOWN SHOPPING CENTRE
LANDMAN, MB

• For Recipient
Attach to your Income Tax Return
SEE INFORMATION ON REVERSE

• Pour le bénéficiaire - Annexer à votre déclaration d'impôt sur le revenu
VOIR LES RENSEIGNEMENTS AU VERSO

2

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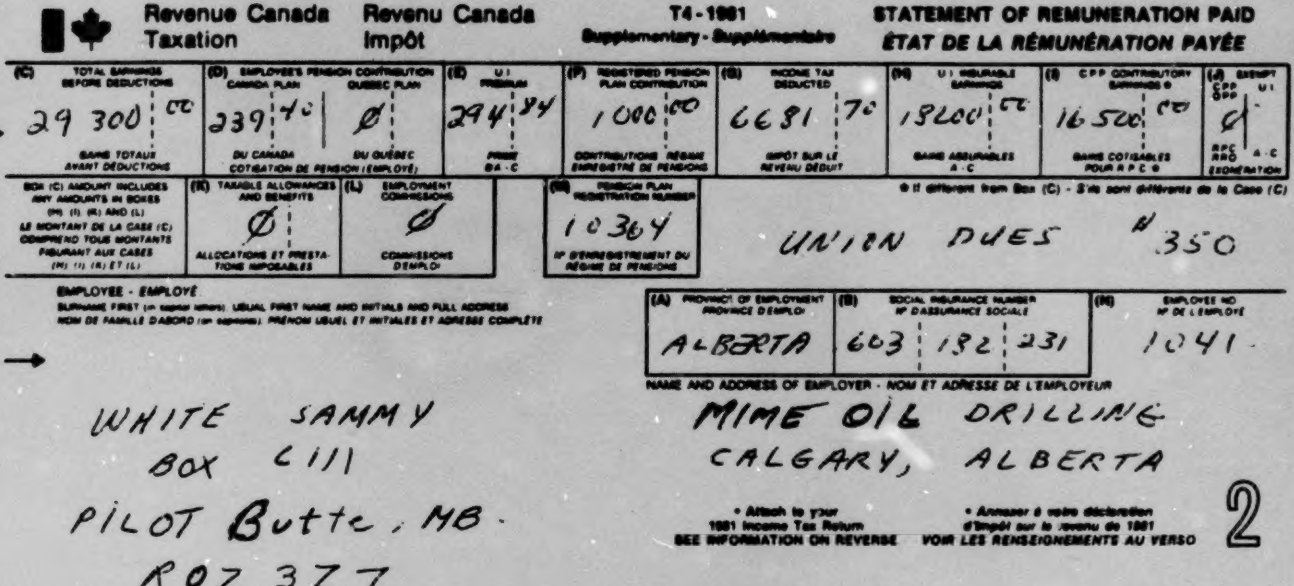
3. Sammy White and his wife, Liz, live in a rented home in Pilot Butte. The Whites have one child, Alice, age 6.

   The Whites' rent is $275 per month.

   Mr. White contributed $300 into a Registered Retirement Savings Plan during the year. Note that he collected Unemployment Insurance for part of the year.

   Mrs. White worked part-time during the year.

   Calculate the total family refund or balance due for the White family, given the following T4, TFAI, T5 and T4U slips.



Revenue Canada Taxation **Revenu Canada Impôt**

T4-1981 Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) Total earnings before deductions / Gains totaux avant déductions	29 300 00
(D) Employee's pension contribution – Canada plan / Du Canada	239 40
(D) Quebec plan / Du Québec	0
(E) U.I. premium / Prime A-C	294 84
(F) Registered pension plan contribution / Contributions régime enregistré de pensions	1 000 00
(G) Income tax deducted / Impôt sur le revenu déduit	6681 70
(H) U.I. insurable earnings / Gains assurables A-C	18200 00
(I) C.P.P. contributory earnings* / Gains cotisables pour R.P.C.*	16 500 00
(J) Exempt CPP QPP U.I. / RPC RRQ A-C exonération	0
Box (C) amount includes any amounts in boxes (M) (I) (K) and (L) / Le montant de la case (C) comprend tous montants figurant aux cases (M) (I) (K) et (L)	
(K) Taxable allowances and benefits / Allocations et prestations imposables	0
(L) Employment commissions / Commissions d'emploi	0
(M) Pension plan registration number / Nº d'enregistrement du régime de pensions	10364

* If different from Box (C) - S'ils sont différents de la Case (C)

UNION DUES $350

EMPLOYEE - EMPLOYÉ
Surname first (in capital letters), usual first name and initials and full address
Nom de famille d'abord (en capitales), prénom usuel et initiales et adresse complète

WHITE SAMMY
BOX 6111
PILOT Butte, MB.
R0Z 3Z7

(A) Province of employment / Province d'emploi	ALBERTA
(B) Social insurance number / Nº d'assurance sociale	603 182 231
(N) Employee no. / Nº de l'employé	1041

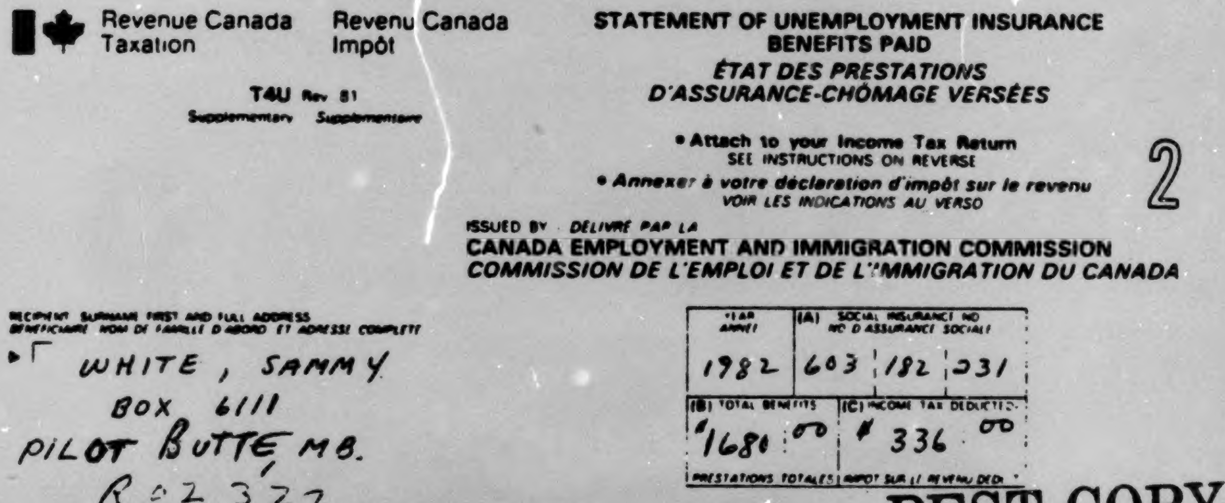
NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

MIME OIL DRILLING
CALGARY, ALBERTA

• Attach to your 1981 Income Tax Return
SEE INFORMATION ON REVERSE

• Annexer à votre déclaration d'impôt sur le revenu de 1981
VOIR LES RENSEIGNEMENTS AU VERSO

2



Revenue Canada Taxation **Revenu Canada Impôt**

T4U Rev. 81
Supplementary Supplémentaire

STATEMENT OF UNEMPLOYMENT INSURANCE BENEFITS PAID
ÉTAT DES PRESTATIONS D'ASSURANCE-CHÔMAGE VERSÉES

• Attach to your Income Tax Return
SEE INSTRUCTIONS ON REVERSE
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VOIR LES INDICATIONS AU VERSO

2

ISSUED BY - *DÉLIVRÉ PAR LA*
CANADA EMPLOYMENT AND IMMIGRATION COMMISSION
COMMISSION DE L'EMPLOI ET DE L'IMMIGRATION DU CANADA

RECIPIENT SURNAME FIRST AND FULL ADDRESS
BÉNÉFICIAIRE NOM DE FAMILLE D'ABORD ET ADRESSE COMPLÈTE

WHITE, SAMMY
BOX 6111
PILOT BUTTE MB.
R0Z 3Z7

Year / Année	1982
(A) Social insurance no. / Nº d'assurance sociale	603 182 231
(B) Total benefits / Prestations totales	$1681 00
(C) Income tax deducted / Impôt sur le revenu déduit	$ 336 00

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Revenue Canada Taxation
Revenu Canada Impôt

T5
Supplementary – *Supplémentaire*
Rev. 81

STATEMENT OF INVESTMENT INCOME
ÉTAT DES REVENUS DE PLACEMENT

Dividends from Taxable Canadian Corporations
Dividendes de corporations canadiennes imposables

Year	(A) Actual Amount of Eligible Dividends Montant réel des dividendes admissibles	(B) Taxable Amount of Eligible Dividends [illegible] imposable des [illegible] admissibles	(C) Federal Dividend Tax Credit Dégrèvement fédéral pour dividendes	(D) Eligible Interest from Canadian Sources H 203.30 Intérêt admissible de sources canadiennes	(I) Capital Gains Dividends Dividendes sur gains en capital	(J) Gross Foreign Income Revenus étrangers bruts
Année	(E) Actual Amount of Ineligible Dividends [illegible] réel des dividendes non admissibles	[illegible] Amount of [illegible] Dividends [illegible] imposable des [illegible] non admissibles	(G) Royalties from Canadian Sources Redevances de sources canadiennes	(H) Other Income from Canadian Sources Autres revenus de sources canadiennes	(K) Foreign Tax Paid Impôt étranger payé	

RECIPIENT: SURNAME FIRST, AND F[illegible] ADDRESS
BÉNÉFICIAIRE: NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

→ WHITE, SAMMY
BOX 6111
PILOT BUTTE
R0Z 3Z7

Social Insurance Number
Numéro d'assurance sociale

603 | 182 | 231

NAME AND ADDRESS OF PAYER (Must appear on each slip)
NOM ET ADRESSE DU PAYEUR (À inscrire sur chaque feuillet)

PILOT BUTTE BANK
PILOT BUTTE, MB.

• For Recipient
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• Pour le bénéficiaire - Annexer à votre déclaration d'impôt sur le revenu
VOIR LES RENSEIGNEMENTS AU VERSO

2

Revenue Canada Taxation
Revenu Canada Impôt

TFA1
Supplementary
Supplémentaire
Rev. 81

STATEMENT OF FAMILY ALLOWANCES
RELEVÉ DES ALLOCATIONS FAMILIALES

(D) YEAR	(E) TOTAL ALLOWANCES	(F) NO. OF CHILDREN	(G) DATE OF BIRTH OF EACH CHILD – DATE DE NAISSANCE DE CHAQUE ENFANT													
			MO	YEAR	MO	YEAR	MO	YEAR	MO	YEAR	MO	YEAR	MO	YEAR	MO	YEAR
198-	H 330 : 48	1	6	76												
									MOIS	ANNÉE	MOIS	ANNÉE	MOIS	ANNÉE	MOIS	ANNÉE
(D) ANNÉE	(E) TOTAL DES ALLOCATIONS	(F) NOMBRE D'ENFANTS	MOIS	ANNÉE	MOIS	ANNÉE	MOIS	ANNÉE								

→

RECIPIENT: SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE: NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

→

WHITE, ELIZABETH
BOX 6111
PILOT BUTTE, MB.
R0Z. 3Z7

(A) RECIPIENT'S SOC. INS. NO 605 : 581 : 632 (A) Nº D'ASS. SOC. DU BÉNÉFIC.	(B) FAMILY ALLOWANCE NO 80446 (B) Nº D'ALLOCATION FAMILIALE
(C) OTHER PARENT'S NAME AND SOCIAL INSURANCE NUMBER SAMMY (C) NOM ET Nº D'ASSURANCE SOCIALE DU CONJOINT	603 : 182 : 231

ISSUED BY HEALTH AND WELFARE CANADA
DÉLIVRÉ PAR SANTÉ ET BIEN ÊTRE SOCIAL CANADA

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Revenue Canada Taxation   Revenu Canada Impôt

T4-1981
Supplementary - supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS / GAINS TOTAUX AVANT DÉDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN / DU CANADA	(D) QUEBEC PLAN / DU QUÉBEC	(E) U I PREMIUM / PRIME DA - C	(F) REGISTERED PENSION PLAN CONTRIBUTION / CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	(G) INCOME TAX DEDUCTED / IMPÔT SUR LE REVENU DÉDUIT	(H) U I INSURABLE EARNINGS / GAINS ASSURABLES A - C	(I) C P P CONTRIBUTORY EARNINGS ● / GAINS COTISABLES POUR R P C ●	(J) EXEMPT CPP QPP / RPC RRQ — U I / A - C EXONÉRATION
2100 00	122 00		116 00	0	0	0	0	

COTISATION DE PENSION (EMPLOYÉ)

BOX (C) AMOUNT INCLUDES, ANY AMOUNTS IN BOXES (H), (I), (K) AND (L) / LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (H), (I), (K) ET (L)	(K) TAXABLE ALLOWANCES AND BENEFITS / ALLOCATIONS ET PRESTATIONS IMPOSABLES	(L) EMPLOYMENT COMMISSIONS / COMMISSIONS D'EMPLOI	(N) PENSION PLAN REGISTRATION NUMBER / Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS
	0	0	—

● If different from Box (C) - S'ils sont différents de la Case (C)

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en capitales), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

→

WHITE , ELIZABETH
BOX 6111
PILOT BUTTE, MB.
R0Z 3Z7

(A) PROVINCE OF EMPLOYMENT / PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER / Nº D'ASSURANCE SOCIALE	(M) EMPLOYEE NO / Nº DE L'EMPLOYÉ
	605 581 632	1362.

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

PILOT BUTTE NURSERIES,
PILOT BUTTE , MB.

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VOIR LES RENSEIGNEMENTS AU VERSO

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4. Tommy Kramer and his wife, Beth, live in an apartment in Windsor, Manitoba. The Kramers have two children, Glen and Carolyn, ages 7 and 4, respectively. The Kramers rent a two-bedroom apartment for $420 a month.

Mr. Karmer contributed $900 into a Registered Retirement Savings Plan during the year and $1000 into a Registered Home Ownership Savings Plan during the year.

Mr. Kramer will use the following T4, TFAI and T5 slips to complete his return.

Mrs. Kramer worked part-time during the year. See her T4 slip.

Calculate the total family refund or balance due for the Kramers.

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Revenue Canada Taxation | Revenu Canada Impôt

T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS / GAINS TOTAUX AVANT DÉDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN / DU CANADA	QUEBEC PLAN / DU QUÉBEC COTISATION DE PENSION (EMPLOYÉ)	(E) U I PREMIUM / PRIME D'A-C	(F) REGISTERED PENSION PLAN CONTRIBUTION / CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	(G) INCOME TAX DEDUCTED / IMPÔT SUR LE REVENU DÉDUIT	(H) U I INSURABLE EARNINGS / GAINS ASSURABLES A-C	(I) CPP CONTRIBUTORY EARNINGS ● / GAINS COTISABLES POUR R P C ●	(J) EXEMPT CPP QPP UI / RPC RRQ A-C EXONÉRATION
$ 23 640 00	239 40		294 84	$ 1500 00	$ 3867 50	18 200 00	$ 16 500 00	✓

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (M), (I), (K) AND (L) / LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (M), (I), (K) ET (L)	(K) TAXABLE ALLOWANCES AND BENEFITS / ALLOCATIONS ET PRESTATIONS IMPOSABLES	(L) EMPLOYMENT COMMISSIONS / COMMISSIONS D'EMPLOI	(M) PENSION PLAN REGISTRATION NUMBER / Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS
	0	0	11362

● If different from Box (C) - S'ils sont différents de la Case (C)

UNION DUES $240

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en majuscules), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

→

KRAMER, TOMMY
507 WILLOW PARK
WINDSOR, MB.
R2J 0X3

(A) PROVINCE OF EMPLOYMENT / PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER / Nº D'ASSURANCE SOCIALE	(N) EMPLOYEE NO / Nº DE L'EMPLOYÉ
MANITOBA	584 634 183	

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

VIKING SPORT SWEAR
BOX 3829
WINDSOR, MB

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SEE INFORMATION ON REVERSE

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VOIR LES RENSEIGNEMENTS AU VERSO

2

Revenue Canada Taxation | Revenu Canada Impôt

T5
Supplementary – Supplémentaire
Rev. 81

STATEMENT OF INVESTMENT INCOME
ÉTAT DES REVENUS DE PLACEMENT

Dividends from Taxable Canadian Corporations
Dividendes de corporations canadiennes imposables

Year / Année	(A) Actual Amount of Eligible Dividends / Montant réel des dividendes admissibles	(B) Taxable Amount of Eligible Dividends / Montant imposable des dividendes admissibles	(C) Federal Dividend Tax Credit / Dégrèvement fédéral pour dividendes	(D) Eligible Interest from Canadian Sources / Intérêt admissible de sources canadiennes	(I) Capital Gains Dividends / Dividendes sur gains en capital	(J) Gross Foreign Income / Revenus étrangers bruts
▶				$ 146.38		
	(E) Actual Amount of Ineligible Dividends / Montant réel des dividendes non admissibles	**(F) Taxable Amount of Ineligible Dividends / Montant imposable des dividendes non admissibles**	**(G) Royalties from Canadian Sources / Redevances de sources canadiennes**	**(H) Other Income from Canadian Sources / Autres revenus de sources canadiennes**	**(K) Foreign Tax Paid / Impôt étranger payé**	
▶						

RECIPIENT : SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE : NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

→

KRAMER, TOMMY
507 WILLOW PARK
WINDSOR, MB.
R2J 0X3

Social Insurance Number
Numéro d'assurance sociale

584	634	183

NAME AND ADDRESS OF PAYER (must appear on each slip)
NOM ET ADRESSE DU PAYEUR (À inscrire sur chaque feuillet)

ANY BANK
WINDSOR, MB.

• For Recipient
Attach to your Income Tax Return
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• Pour le bénéficiaire - Annexer à votre déclaration d'impôt sur le revenu
VOIR LES RENSEIGNEMENTS AU VERSO

2

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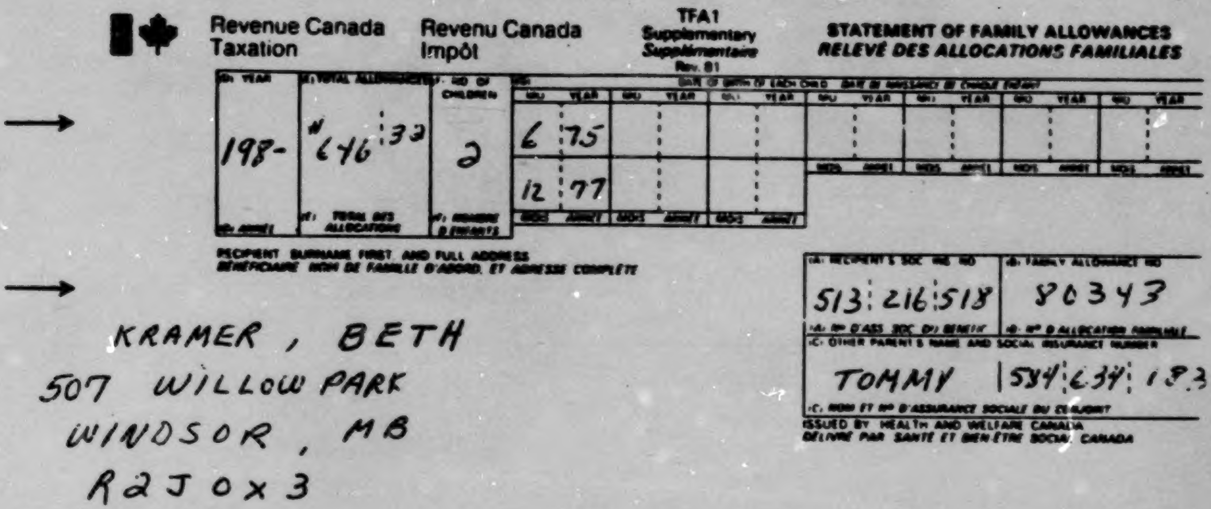


Revenue Canada Taxation | Revenu Canada Impôt

TFA1 Supplementary Supplémentaire Rev. 81

STATEMENT OF FAMILY ALLOWANCES
RELEVÉ DES ALLOCATIONS FAMILIALES

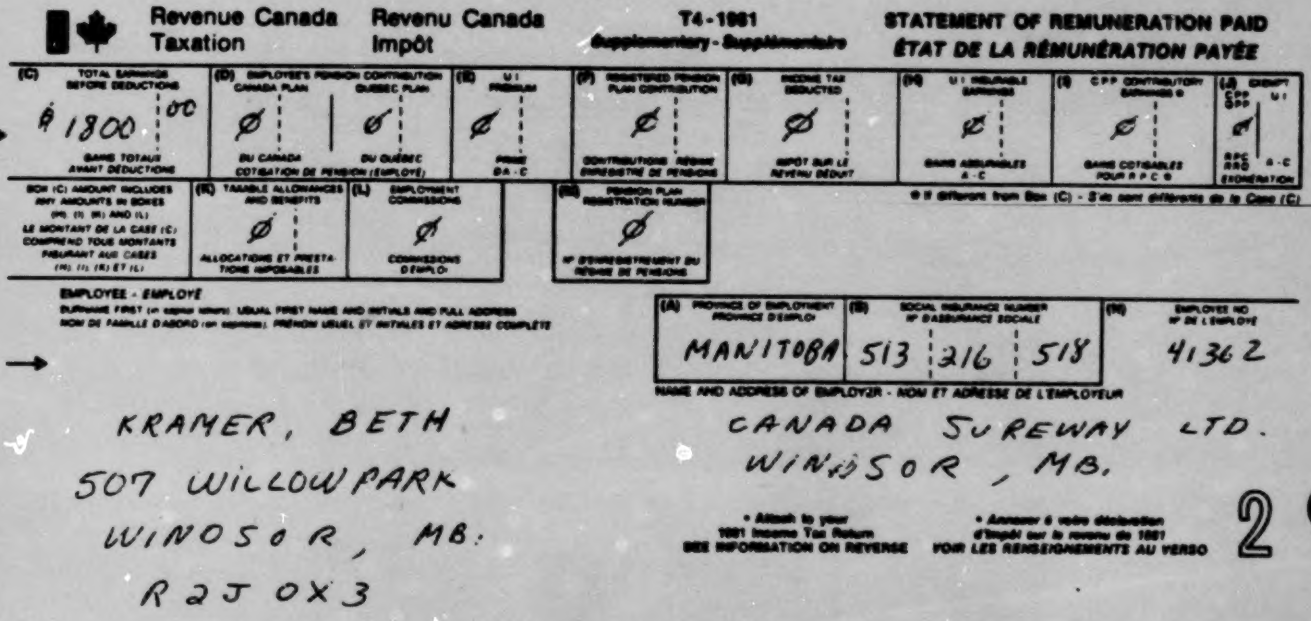
YEAR / ANNÉE: 198-
TOTAL ALLOWANCES / TOTAL DES ALLOCATIONS: $646.33
NO. OF CHILDREN / NOMBRE D'ENFANTS: 2
DATE OF BIRTH OF EACH CHILD / DATE DE NAISSANCE DE CHAQUE ENFANT (MO. YEAR / MOIS ANNÉE): 6 75; 12 77

RECIPIENT SURNAME FIRST AND FULL ADDRESS
BÉNÉFICIAIRE NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

KRAMER, BETH
507 WILLOW PARK
WINDSOR, MB
R2J 0X3

(A) RECIPIENT'S SOC. INS. NO. / Nº D'ASS. SOC. DU BÉNÉF.: 513 216 518
(B) FAMILY ALLOWANCE NO. / Nº D'ALLOCATION FAMILIALE: 80343
(C) OTHER PARENT'S NAME AND SOCIAL INSURANCE NUMBER / NOM ET Nº D'ASSURANCE SOCIALE DU CONJOINT: TOMMY 534 634 183

ISSUED BY HEALTH AND WELFARE CANADA
DÉLIVRÉ PAR SANTÉ ET BIEN-ÊTRE SOCIAL CANADA



Revenue Canada Taxation | Revenu Canada Impôt

T4-1981 Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS / GAINS TOTAUX AVANT DÉDUCTIONS: $1800.00
(D) EMPLOYEE'S PENSION CONTRIBUTION – CANADA PLAN / DU CANADA: 0; QUEBEC PLAN / DU QUÉBEC: 0
(E) U.I. PREMIUM / PRIME D'A.-C.: 0
(F) REGISTERED PENSION PLAN CONTRIBUTION / CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS: 0
(G) INCOME TAX DEDUCTED / IMPÔT SUR LE REVENU DÉDUIT: 0
(H) U.I. INSURABLE EARNINGS / GAINS ASSURABLES A.-C.: 0
(I) C.P.P. CONTRIBUTORY EARNINGS ● / GAINS COTISABLES POUR R.P.C. ●: 0
(J) EXEMPT CPP QPP U.I. / RPC RRQ A.-C. EXONÉRATION: 0

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (H), (I), (K) AND (L)
LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (H), (I), (K) ET (L)

(K) TAXABLE ALLOWANCES AND BENEFITS / ALLOCATIONS ET PRESTATIONS IMPOSABLES: 0
(L) EMPLOYMENT COMMISSIONS / COMMISSIONS D'EMPLOI: 0
(M) PENSION PLAN REGISTRATION NUMBER / Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS: 0

● If different from Box (C) - S'ils sont différents de la Case (C)

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en capitales), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

KRAMER, BETH
507 WILLOW PARK
WINDSOR, MB.
R2J 0X3

(A) PROVINCE OF EMPLOYMENT / PROVINCE D'EMPLOI: MANITOBA
(B) SOCIAL INSURANCE NUMBER / Nº D'ASSURANCE SOCIALE: 513 216 518
(N) EMPLOYEE NO. / Nº DE L'EMPLOYÉ: 41362

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

CANADA SUREWAY LTD.
WINDSOR, MB.

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VOIR LES RENSEIGNEMENTS AU VERSO

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5. Don and Sharon Harder live in the town of Highland, MB. Don is employed with the Big Hills School Division as a teacher. They have two children, Dennis and Rachel, who are 5 and 3, respectively.

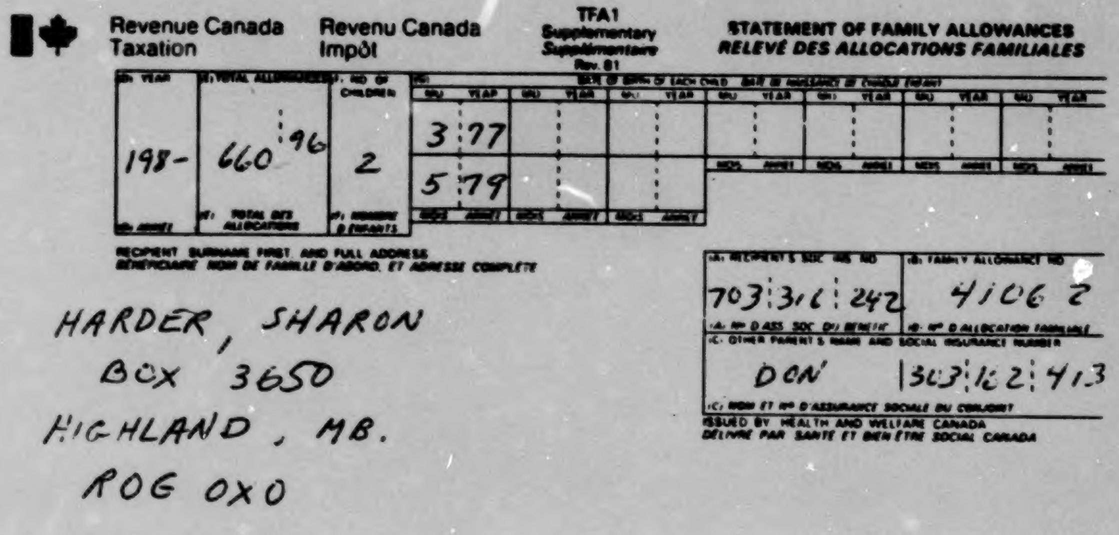
Don and Sharon paid property taxes last year as follows:

TOTAL	$860
Less: Resident Homeowner Tax Assistance	$325
Net Property Tax	$335

Sharon did not work this year but must fill in an Income Tax Return and Schedule 10 - Child Tax Credit - in order to calculate the total family refund or balance due.

Don contributed $1200 into a Registered Retirement Savings Plan with the Registered Trust Company.

Use the T4, TFA1 and T5 slips to complete their return.



Revenue Canada Taxation / Revenu Canada Impôt

TFA1 Supplementary / Supplémentaire Rev. 81

STATEMENT OF FAMILY ALLOWANCES
RELEVÉ DES ALLOCATIONS FAMILIALES

Year / Année	Total allowances / Total des allocations	No. of children / Nombre d'enfants	Date of birth of each child (Mo : Year)
198-	660 : 96	2	3 : 77 5 : 79

RECIPIENT SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

HARDER, SHARON
BOX 3650
HIGHLAND, MB.
R0G 0X0

(A) RECIPIENT'S SOC. INS. NO. / N° D'ASS. SOC. DU BÉNÉFIC.: 703 : 310 : 242
(B) FAMILY ALLOWANCE NO. / N° D'ALLOCATION FAMILIALE: 4106 2
(C) OTHER PARENT'S NAME AND SOCIAL INSURANCE NUMBER / NOM ET N° D'ASSURANCE SOCIALE DU CONJOINT: DON 303 : 102 : 413

ISSUED BY HEALTH AND WELFARE CANADA
DÉLIVRÉ PAR SANTÉ ET BIEN-ÊTRE SOCIAL CANADA

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Revenue Canada Taxation | Revenu Canada Impôt

T5
Supplementary – Supplémentaire

STATEMENT OF INVESTMENT INCOME
ÉTAT DES REVENUS DE PLACEMENT

Rev. 81

Dividends from Taxable Canadian Corporations / Dividendes de corporations canadiennes imposables

Year	(A) Actual Amount of Eligible Dividends Montant réel des dividendes admissibles	(B) Taxable Amount of Eligible Dividends Montant imposable des dividendes admissibles	(C) Federal Dividend Tax Credit Dégrèvement fédéral pour dividendes	(D) Eligible Interest from Canadian Sources $ 430.20 Intérêts admissibles de sources canadiennes	(I) Capital Gains Dividends Dividendes sur gains en capital	(J) Gross Foreign Income Revenus étrangers bruts
Année	(E) Actual Amount of Ineligible Dividends Montant réel des dividendes non admissibles	(F) Taxable Amount of Ineligible Dividends Montant imposable des dividendes non admissibles	(G) Royalties from Canadian Sources Redevances de sources canadiennes	(H) Other Income from Canadian Sources Autres revenus de sources canadiennes	(K) Foreign Tax Paid Impôt étranger payé	

RECIPIENT: SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE: NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

→

HARDER, DON
BOX 3650
HIGHLAND, MB.
R0G 0X0

Social Insurance Number / Numéro d'assurance sociale
303 | 162 | 413

NAME AND ADDRESS OF PAYER (Must appear on each slip)
NOM ET ADRESSE DU PAYEUR (À inscrire sur chaque feuillet)

BIG HILLS CREDIT UNION
HIGHLAND MB

• For Recipient
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SEE INFORMATION ON REVERSE

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VOIR LES RENSEIGNEMENTS AU VERSO

2

Revenue Canada Taxation | Revenu Canada Impôt

T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS 30 150.00 GAINS TOTAUX AVANT DÉDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN 239.40 DU CANADA COTISATION DE PENSION (EMPLOYÉ)	QUEBEC PLAN — DU QUÉBEC	(E) U.I. PREMIUM 294.84 PRIME A-C	(F) REGISTERED PENSION PLAN CONTRIBUTION 1800.00 CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	(G) INCOME TAX DEDUCTED 5354.20 IMPÔT SUR LE REVENU DÉDUIT	(H) U.I. INSURABLE EARNINGS 13 200.00 GAINS ASSURABLES A-C	(I) C.P.P. CONTRIBUTORY EARNINGS • 16 500.00 GAINS COTISABLES POUR R.P.C. •	(J) EXEMPT CPP QPP 0 RPC RRQ EXONÉRATION	U.I. A-C

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (F), (I), (K) AND (L) LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (F), (I), (K) ET (L)	(K) TAXABLE ALLOWANCES AND BENEFITS 0 ALLOCATIONS ET PRESTATIONS IMPOSABLES	(L) EMPLOYMENT COMMISSIONS 0 COMMISSIONS D'EMPLOI	(M) PENSION PLAN REGISTRATION NUMBER 15362 Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS

• If different from Box (C) - S'ils sont différents de la Case (C)

UNION DUES $288.00

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en majuscules), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

→

HARDER, DON
BOX 3650
HIGHLAND, MB.
R0G 0X0

(A) PROVINCE OF EMPLOYMENT PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER Nº D'ASSURANCE SOCIALE	(N) EMPLOYEE NO. Nº DE L'EMPLOYÉ
MANITOBA	303 162 413	

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

BIG HILLS SCHOOL DIVISION
HIGHLAND, MANITOBA

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SEE INFORMATION ON REVERSE

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VOIR LES RENSEIGNEMENTS AU VERSO

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Review Question

Rob Williamson is a truck driver for Steamer Express (see Rob's attached T4 and T5 slips). Rob is married to Monique, who works as a receptionist for Arctic Securities (see Monique's attached T4 slip).

Rob and Monique have two children in school, Bob and Susan, ages 8 and 9 (see attached TFAI slip).

Rob and Monique pay rent of $425 a month for an unfurnished three-bedroom home. Rob will claim the Manitoba Cost of Living Tax Credit and the Manitoba Property Tax Credit on his return.

Rob contributed $900 into a Registered Retirement Savings Plan and also contributed $1000 into a Registered Home Ownership Savings Plan.

Complete separate returns for both Rob and Monique.

Revenue Canada Taxation — Revenu Canada Impôt

T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS / GAINS TOTAUX AVANT DEDUCTIONS: → 27 350.00
(D) EMPLOYEE'S PENSION CONTRIBUTION — CANADA PLAN / DU CANADA: 239.40 — QUEBEC PLAN / DU QUÉBEC — COTISATION DE PENSION (EMPLOYÉ)
(E) U I PREMIUM / PRIME A-C: 294.84
(F) REGISTERED PENSION PLAN CONTRIBUTION / CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS: 1261.00
(G) INCOME TAX DEDUCTED / IMPÔT SUR LE REVENU DÉDUIT: 5592.30
(H) U I INSURABLE EARNINGS / GAINS ASSURABLES A-C: 18200.00
(I) CPP CONTRIBUTORY EARNINGS ● / GAINS COTISABLES POUR R P C ●: 16500.00
(J) EXEMPT CPP QPP — UI / RPC RRQ — A-C EXONÉRATION: 0

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (K) (L) (M) AND (L) / LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (K) (L) (M) ET (L)
(K) TAXABLE ALLOWANCES AND BENEFITS / ALLOCATIONS ET PRESTATIONS IMPOSABLES: 0
(L) EMPLOYMENT COMMISSIONS / COMMISSIONS D'EMPLOI: 0
(M) PENSION PLAN REGISTRATION NUMBER / Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS: 1562

● If different from Box (C) - S'ils sont différents de la Case (C)

ASSOCIATION DUES #140

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en majuscules), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE
→

WILLIAMSON, ROB
107 DIVIAN AVE
MOOSELEG , MB.
R2J 0V6

(A) PROVINCE OF EMPLOYMENT / PROVINCE D'EMPLOI: MANITOBA
(B) SOCIAL INSURANCE NUMBER / Nº D'ASSURANCE SOCIALE: 610 361 444
(N) EMPLOYEE NO / Nº DE L'EMPLOYÉ: 3561

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

STEAMER EXPRESS
MOOSELEG, MANITOBA

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SEE INFORMATION ON REVERSE

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VOIR LES RENSEIGNEMENTS AU VERSO

2

Revenue Canada Taxation — Revenu Canada Impôt

T5
Supplementary — *Supplémentaire*
Rev. 81

STATEMENT OF INVESTMENT INCOME
ÉTAT DES REVENUS DE PLACEMENT

Year / Année ▶ ▶

Dividends from Taxable Canadian Corporations / Dividendes de corporations canadiennes imposables
(A) Actual Amount of Eligible Dividends / Montant réel des dividendes admissibles
(B) Taxable Amount of Eligible Dividends / Montant imposable des dividendes admissibles
(C) Federal Dividend Tax Credit / Dégrèvement fédéral pour dividendes
(E) Actual Amount of Ineligible Dividends / Montant réel des dividendes non admissibles
(F) Taxable Amount of Ineligible Dividends / Montant imposable des dividendes non admissibles
(G) Royalties from Canadian Sources / Redevances de sources canadiennes
(D) Eligible Interest from Canadian Sources / Intérêt admissible de sources canadiennes: 386.00
(H) Other Income from Canadian Sources / Autres revenus de sources canadiennes
(I) Capital Gains Dividends / Dividendes sur gains en capital
(K) Foreign Tax Paid / Impôt étranger payé
(J) Gross Foreign Income / Revenus étrangers bruts

RECIPIENT: SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE: NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE
→

WILLIAMSON, ROB
107 DIVIAN AVE
MOOSE LEG , MB.
R2J 0V6

Social Insurance Number / Numéro d'assurance sociale: 610 | 361 | 444

NAME AND ADDRESS OF PAYER (must appear on each slip)
NOM ET ADRESSE DU PAYEUR (à inscrire sur chaque feuillet)

MERIDIAN BANK
MOOSE LEG MB.

• For Recipient
Attach to your Income Tax Return
SEE INFORMATION ON REVERSE

• Pour le bénéficiaire — Annexer à votre déclaration d'impôt sur le revenu
VOIR LES RENSEIGNEMENTS AU VERSO

2

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Revenue Canada Taxation — Revenu Canada Impôt

TFA1
Supplementary
Supplémentaire
Rev. 81

STATEMENT OF FAMILY ALLOWANCES
RELEVÉ DES ALLOCATIONS FAMILIALES

(1) YEAR / (1) ANNÉE	(2) TOTAL ALLOWANCES / (2) TOTAL DES ALLOCATIONS	(3) NO. OF CHILDREN / (3) NOMBRE D'ENFANTS	(4) DATE OF BIRTH OF EACH CHILD - DATE DE NAISSANCE DE CHAQUE ENFANT MO. / MOIS	YEAR / ANNÉE
198-	641 : 24	2	3	77
			4	73

RECIPIENT SURNAME FIRST, AND FULL ADDRESS
BÉNÉFICIAIRE NOM DE FAMILLE D'ABORD, ET ADRESSE COMPLÈTE

WILLIAMSON, MONIQUE
107 DIVIAN AVE.
MOOSE LEG, MB.
R2J 0U6

(A) RECIPIENT'S SOC. INS. NO. / (A) Nº D'ASS. SOC. DU BÉNÉFIC.: 506 312 213

(B) FAMILY ALLOWANCE NO. / (B) Nº D'ALLOCATION FAMILIALE: 81 365

(C) OTHER PARENT'S NAME AND SOCIAL INSURANCE NUMBER / (C) NOM ET Nº D'ASSURANCE SOCIALE DU CONJOINT: ROB 610 361 44-

ISSUED BY HEALTH AND WELFARE CANADA
DÉLIVRÉ PAR SANTÉ ET BIEN-ÊTRE SOCIAL CANADA

Revenue Canada Taxation — Revenu Canada Impôt

T4-1981
Supplementary - Supplémentaire

STATEMENT OF REMUNERATION PAID
ÉTAT DE LA RÉMUNÉRATION PAYÉE

(C) TOTAL EARNINGS BEFORE DEDUCTIONS / GAINS TOTAUX AVANT DÉDUCTIONS	(D) EMPLOYEE'S PENSION CONTRIBUTION CANADA PLAN / DU CANADA	QUEBEC PLAN / DU QUÉBEC	(E) U.I. PREMIUM / PRIME BA-C	(F) REGISTERED PENSION PLAN CONTRIBUTION / CONTRIBUTIONS RÉGIME ENREGISTRÉ DE PENSIONS	(G) INCOME TAX DEDUCTED / IMPÔT SUR LE REVENU DÉDUIT	(H) U.I. INSURABLE EARNINGS / GAINS ASSURABLES A-C	(I) C.P.P. CONTRIBUTORY EARNINGS ● / GAINS COTISABLES POUR R.P.C. ●	(J) EXEMPT CPP QPP U.I / RPC RRQ A-C EXONÉRATION
13800 : 00	239 : 40		294 : 84	800 : 00	2035 : 10	13800 : 00	13800 : 00	0

● If different from Box (C) - S'ils sont différents de la Case (C)

BOX (C) AMOUNT INCLUDES ANY AMOUNTS IN BOXES (M), (I), (K) AND (L) / LE MONTANT DE LA CASE (C) COMPREND TOUS MONTANTS FIGURANT AUX CASES (M), (I), (K) ET (L)	(K) TAXABLE ALLOWANCES AND BENEFITS / ALLOCATIONS ET PRESTATIONS IMPOSABLES	(L) EMPLOYMENT COMMISSIONS / COMMISSIONS D'EMPLOI	(M) PENSION PLAN REGISTRATION NUMBER / Nº D'ENREGISTREMENT DU RÉGIME DE PENSIONS
	0	0	10003

EMPLOYEE - EMPLOYÉ
SURNAME FIRST (in capital letters), USUAL FIRST NAME AND INITIALS AND FULL ADDRESS
NOM DE FAMILLE D'ABORD (en majuscules), PRÉNOM USUEL ET INITIALES ET ADRESSE COMPLÈTE

WILLIAMSON, MONIQUE
107 VIVIAN AVE.
MOOSE LEG, MB.
R2J 0U6

(A) PROVINCE OF EMPLOYMENT / PROVINCE D'EMPLOI	(B) SOCIAL INSURANCE NUMBER / Nº D'ASSURANCE SOCIALE	(N) EMPLOYEE NO. / Nº DE L'EMPLOYÉ
MANITOBA	506 312 213	436

NAME AND ADDRESS OF EMPLOYER - NOM ET ADRESSE DE L'EMPLOYEUR

ARCTIC SECURITIES
MOOSE LEG, MB.

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VOIR LES RENSEIGNEMENTS AU VERSO

2

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Real Property Tax

1. 1. Calculate the rate of assessment in cents on a dollar, to the nearest tenth of a cent, for each of the following years in the Town of Limpet:

	Year	Assessed Value of Real Property	Budget Requirement	Rate of Assessment
a)	1980	$1 900 000	$62 000	
b)	1981	$1 940 000	$70 000	
c)	1982	$2 030 000	$76 000	

2. The money to be raised by taxes in Williamsville is $150 310. The assessed valuation of the property is $6 320 000. Calculate the rate of assessment to the nearest tenth of a cent.

3. Calculate the rate of assessment in the form of a percent rate, to the nearest tenth of a percent, for each of the years indicated in the City of Bigg:

	Year	Assessed Value of Real Property	Budget Requirement	Rate of Assessment
a)	1978	$890 000 000	$78 000 000	
b)	1980	$942 000 000	$86 000 000	
c)	1982	$965 000 000	$102 000 000	

4. In Carswell, $380 000 is to be raised by means of a real estate tax. The assessed valuation of the real estate in Carswell is $20 300 000. What tax rate, in the form of a percent rate to the nearest tenth of a percent, is required for Carswell?

5. Calculate the rate of assessment, in terms of mills, to the nearest whole mill for each of the years listed, in the Rural Municipality of St. Ives.

	Year	Assessment Value of Real Property	Budget Requirement	Rate of Assessment
a)	1972	$780 000 000	$69 000 000	
b)	1977	$850 000 000	$82 000 000	
c)	1982	$945 000 000	$95 000 000	

6. The budget for next year for the Town of Rosebud is $452 000. Revenue from sources such as licences and fines and provincial government grants total $136 000. The taxable property in the town has a total assessed valuation of $7 600 000. What tax rate, to the nearest mill, must be levied on property in Rosebud next year?

7. In the small city of Parson City, the budget for the coming year is estimated to be $21 000 000. Income from all sources is expected to be $8 300 000. The balance is to be raised by a property tax on a total assessment roll of $140 000 000. Find the tax rate correct to the nearest mill.

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2

1. Complete the following table:

	Property	Assessed Value	Tax Rate	General Tax
a)	Building Lot	$ 7 200	4¢	
b)	House	$ 44 800	2.5¢	
c)	Farm	$165 000	2¢	
d)	Factory	$180 000	5¢	
e)	Duplex	$ 67 500	3¢	

2. The Watsons have a new house for which they paid $62 000. It is assessed at $25 000. If the tax rate in their area is 4¢ on the dollar of assessed value, find the amount of the Watsons' general tax for the year.

3. Alan Oxford's tax bill states that the assessed value of his property amounts to $14 000, and that taxes are calculated on the basis of 7¢ on a dollar. There is a local improvement tax for ornamental street lighting, which amounts to $93.50 for the year. Calculate Mr. Oxford's total tax bill for the year.

4. Complete the following table:

	Property	Assessed Value	Tax Rate	General Tax
a)	Roominghouse	$ 46 000	5%	
b)	Office building	$680 000	3%	
c)	House	$ 24 000	4%	
d)	Lot	$ 5 000	5%	

5. The Martins own a house valued at $52 000. If it is assessed at 40% of market value, and the tax is assessed at 5% of assessed value, calculate the general tax bill for the year.

6. The Renchuks own an office building with a market value of $220 000. The property is assessed at 30% and the tax rate is 5%. In addition, there are two local improvements to be paid: paving which costs $1500, spread over 10 years, and ornamental street lighting which costs $860, also distributed over a 10-year period. Calculate the Renchuks' total tax bill for this year.

7. Complete the following table:

Property	Assessed Value	Tax Rate	General Tax
a) Bungalow	$16 000	62 mills	________
b) Factory	$58 000	64 mills	________
c) Commercial Lot	$ 5 000	38 mills	________
d) Duplex	$27 500	60 mills	________

8. Complete the following table:

Property	Market Value	Assessment Value	Assessed Value	Mill Rate	General Tax	Local Improvements	Total Tax Bill
a) Cottage	$28 000	40%	________	52	________	0	________
b) Bungalow	$52 000	42%	________	55	________	135.20	________
c) Duplex	$88 000	48%	________	60	________	168.85	________
d) Factory	$25 600	50%	________	62	________	345.50	________

9. Janet Guthrie purchased a new house for $38 000. It was assessed for tax purposes at 40% and the mill rate was set for the year at 61. If there is also a local improvements tax of $128.50 for sidewalks, calculate the total tax for the year.

10. The Smiths purchased a $50 000 house. In their first year of occupancy, the assessment was at a rate of 30%, and the mill rate for that year was 68. The property was re-assessed the next year at a new rate of 35%, and the mill rate increased to 70 mills. Find the amount of the general tax increase from year one to year two.

Hidden Taxes

1. 1. Calculate the federal sales tax on the following goods:

Item	Number	Unit Cost	Federal Sales Tax
a) Refrigerators	10	$310	
b) Televisions	8	$430	
c) Bicycles	100	$ 83	
d) Sofas	20	$609	
e) Bookcases	5	$250	

Note: Federal Sales Tax varies from time to time. Currently, it is 10%.

2. What is the federal sales tax on a shipment to the retailer of 25 chairs at a unit cost of $32.50?

2. Below is a table of custom tariffs. Use the table to answer the questions that follow.

Customs Tariffs

Goods	British Pref.	Most Favoured Nation	General	Goods	British Pref.	Most Favoured Nation	General
Automobiles	Free	15%	27.5%	Jewellery, gold	20 %	25 %	45 %
Baskets, wire	10%	17.5 %	35 %	Jewellery, not gold	20 %	25 %	45 %
Bottles, glass	15 %	15 %	32.5 %	Pencils, lead	10 %	15 %	35 %
Brushes, artist	Free	17.5 %	30 %	Perfumery (no-alcohol)	15 %	15 %	40 %
Cabinets, wood	15 %	20 %	45 %	Phonographs and parts thereof	10 %	15 %	25 %
Combs	10 %	20 %	30 %	Radio and television apparatus	Free	15 %	25 %
Cellophane, not printed	10 %	10 %	20 %	Tobacco, cut per pound	40¢	40¢	75¢
Drills, hand	10 %	15 %	35 %	Watches	15%	20%	35%
Fabrics, wholly of cotton	22.5 %	22.5 %	35 %				

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Note: To calculate the total cost of imports:

a) Find the total invoice in Canadian funds.
b) Calculate the customs tariffs that apply.
c) Add (a) and (b) to find the duty-paid value.
d) Find the federal sales tax on the duty-paid value.
e) Find the excise tax, if required, on the duty-paid value.
f) Add (c), (d) and (e) to find the total cost of the import.

1. Wood cabinets costing $250 each were imported from Britain. The retailer purchased ten of these cabinets. What would be the custom tariff added on to the price of these cabinets?

2. A local retail store decided to import 100 bottles of perfume at a price of $5.00. The country from which the perfume was purchased was in the "Most Favoured Nation" category. After this tax was added to the cost, an additional 10% federal sales tax was added. What was the total cost of the shipment of perfume?

3. A local hardware store must decide between two hand drills. One is available from Britain at a price of $17 plus custom tariff plus federal sales tax. A second drill is available from the United States at $15.50 plus custom tariff plus federal sales tax. Which of the two prices would have a lower cost price to the merchant importing the goods?

4. Phonograph records are imported from the United States at a price of $3.00. A record store purchased 1000 records. The records were subject to custom tariffs plus federal sales tax. What would be the total cost of the records to the record store?

3. Below is a table of Excise Taxes. Use the table to answer the questions that follow.

Excise Taxes

Goods	Rate
Lighters	10¢ per lighter
Coin, disc or token operated games or amusement devices	10%
Smoker's accessories	10%
Cigars	20.5%
Matches	10%
Clocks and watches	10% ← of the amount by which the sales price or duty-paid value of each watch exceeds $50.00.
Jewellery	10%
Cigarettes (for each five cigarettes or fraction of five)	3¢
Tobacco, manufactured (per pound)	90¢
Playing cards (per pack)	20¢
Wine (per gallon) less than 7% alcohol	25¢
Champagne and sparkling wines (per gallon)	$2.50

1. An amusement store purchased 100 decks of playing cards at 50 cents per deck. The store paid the required excise tax plus the federal sales tax. What would be the total cost of the playing cards to the store?

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2. A cigarette company in Canada imported 1500 pounds of tobacco from the United States at $2.50 a pound. The company had to pay the necessary custom tariff, plus the excise tax, plus the required federal sales tax. Calculate the total cost to import the tobacco.

3. A jewellery store imported a shipment of watches from Japan, a most favoured nation. The watches cost $80 Canadian. The watches were subject to custom tariffs, excise duties and federal sales tax. Calculate the total cost to the jewellery store if they imported 25 of these watches.

4. A jewellery store imported a shipment of $1500 worth of gold jewellery from Afganistan, which falls into the general custom tariff category. Calculate the total cost to the store if the jewellery was subject to custom tariffs, federal sales tax, and excise taxes.

C. INSURANCE

Use the Premium Rate Table to answer the following questions:

Life Insurance

PREMIUM RATE TABLE

LIFE INSURANCE: ANNUAL PREMIUMS (PER $1000 WORTH OF INSURANCE)

AGE AT ISSUE	TERM 10 YEARS	TERM 15 YEARS	WHOLE LIFE (TO AGE 85)	LIMITED-PAYMENT LIFE (TO AGE 65)	ENDOWMENT TO AGE 60	ENDOWMENT TO AGE 65
15	$3.58	$4.08	$11.14	$11.82	$14.35	$14.98
16	3.64	4.10	11.48	12.21	14.85	15.86
17	3.70	4.13	11.82	12.60	15.34	16.74
18	3.76	4.15	12.06	12.99	15.84	17.62
19	3.83	4.17	12.50	13.38	16.34	18.50
20	3.90	4.20	12.86	13.77	16.84	19.37
21	3.96	4.22	13.25	14.26	17.48	20.17
22	4.02	4.24	13.66	14.75	18.13	20.97
23	4.09	4.26	14.07	15.24	18.78	21.77
24	4.16	4.28	14.48	15.73	19.43	22.57
25	4.23	4.31	14.87	16.23	20.07	23.38
26	4.29	4.42	15.39	16.90	20.92	24.48
27	4.36	4.53	15.91	17.58	21.77	25.58
28	4.43	4.64	16.44	18.26	22.62	26.68
29	4.50	4.75	16.97	18.94	23.48	27.79
30	4.57	4.86	17.48	19.61	24.34	28.90
31	4.74	5.10	18.15	20.54	25.52	30.49
32	4.91	5.34	18.83	21.47	26.70	32.08
33	5.09	5.58	19.51	22.40	27.88	33.67
34	5.27	5.82	20.20	23.32	29.05	35.26
35	5.46	6.05	20.87	24.24	30.22	36.85
36	5.78	6.44	21.71	25.51	31.88	39.21
37	6.10	6.83	22.56	26.78	33.55	41.57
38	6.42	7.22	23.41	28.05	35.23	43.93
39	6.74	7.61	24.26	29.32	36.90	46.29
40	7.10	8.00	25.10	30.61	38.55	48.65
41	7.58	8.60	26.20	32.50	41.00	52.49
42	8.06	9.20	27.30	34.39	43.45	56.33
43	8.54	9.80	28.40	36.28	45.90	60.17
44	9.02	10.40	29.50	38.17	48.34	64.00
45	9.53	10.99	30.60	40.05	50.82	67.83
46	10.28	12.00	32.02	43.07	54.74	75.25
47	11.03	13.01	33.44	46.09	58.66	82.67
48	11.78	14.02	34.86	49.11	62.58	90.09
49	12.53	15.03	36.28	52.13	66.50	97.50
50	13.32	16.04	37.72	55.15	70.41	104.91
51	14.75	17.70	39.58	60.86	77.97	
52	16.18	19.36	41.44	66.57	85.53	
53	17.61	21.02	43.30	72.28	93.09	
54	19.04	22.68	45.16	77.99	100.64	
55	20.47	24.34	47.02	83.68	108.19	
56	22.61	25.90	49.60			
57	25.15	27.46	52.18			
58	27.49	29.02	54.76			
59	29.83	30.59	57.35			
60	32.17	32.17	59.94			

PERIODIC PREMIUM TABLE

If Period Is:	Multiply Annual Premium By:
Semiannual	0.51
Quarterly	0.26
Monthly	0.087

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4. 1. Calculate the annual premium for each of the following:

	Age at Time of Issue	Type of Policy	Amount of Policy	Annual Premium
a)	15	10-year term	$15 000	
b)	40	whole life	$50 000	
c)	25	limited-payment life	$40 000	
d)	43	endowment (to age 60)	$35 000	
e)	35	15-year term	$100 000	
f)	50	endowment (to age 65)	$60 000	
g)	20	whole life	$75 000	
h)	55	10-year term	$150 000	
i)	30	limited-payment life	$50 000	
j)	45	endowment (to age 60)	$60 000	

2. Find the periodic payment on each policy.

	Age At Time of Issue	Type of Policy	Amount of Policy	Period	Periodic Payment
a)	25	endowment (to age 60)	$4 500	semi-annually	
b)	40	whole life	$25 500	quarterly	
c)	15	10-year term	$45 000	monthly	
d)	55	limited-payment life	$60 000	semi-annually	
e)	20	endowment (to age 65)	$100 000	monthly	
f)	30	15-year term	$75 000	quarterly	

3. Shaylin Kristin purchased a $10 000, 10 year term policy at age 20. If she had purchased the policy at age 15, how much less would her annual premiums have been?

4. At age 40, how much 10-year term insurance can be purchased for an annual premium of $319.50?

5. Tim took out a Limited-Payment Life insurance policy at age 35 for $100 000. He died after paying premiums for 15 years. What is the total of the premiums he had paid into the insurance plan? How much would his beneficiary receive?

6. At age 23, how much 15-year term insurance could be purchased for an annual premium of $106.50?

7. How much more will the premiums be on a $30 000, 15-year term insurance policy than for a $30 000, 10-year term insurance policy, if you are 30 years old?

8. Jon Stenaurd purchased a whole-life policy for $25 000 at age 30. How much less would his annual premium have been if he had purchased the policy at age 25?

7. Property Insurance

Note: Tables required for the following question are located after page 31. Up-to-date tables may be obtained from Manitoba Public Insurance Corporation or other insurance companies.

1. Refer to the "Select Table - Building" to compute the annual premium of each fire insurance policy.

Policy	Amount of Insurance	Location	Deductible	Annual Premium
a)	$ 40 000	Metro Wpg.	$ 50	
b)	$ 65 000	Table 1	$100	
c)	$ 80 000	Table 3	$ 50	
d)	$ 95 000	Metro Wpg.	$100	
e)	$150 000	Table 2	$ 50	
f)	$250 000	Table 3	$ 50	
g)	$ 30 000	Table 1	$100	
h)	$325 000	Metro Wpg.	$100	

2. Find the difference in annual premiums. "Use Select Table - Building." (Note: Premiums are $50 deductible.)

	Amount of Insurance	Location		Difference
		Metro Wpg.	Table 3	
a)	$ 40 000	$	$	$
b)	$140 000	$	$	$
c)	$ 85 000	$	$	$
d)	$ 65 000	$	$	$

3. Darrin lives in Metro Wpg. and carries a $75 0000 fire insurance policy on his house. Danny lives in a town classified as Table 2 with a $60 0000 fire insurance policy. Each policy has $100 deductible. What is the difference in premiums?

8.

1. From the Homeowner "Standard Rates" table, calculate the annual premium for each of the following homeowner's policies.

	Basic Coverage	Location	Premium
a)	$ 95 000	Table 1 $50 deductible	
b)	$150 000	Table 3 $50 deductible	
c)	$125 000	Table 2 $100 deductible	
d)	$ 55 000	Metro Wpg. $100 deductible	

2. Find the differences in annual premiums. (Note: Premiums are $100 deductible.)

	Amount of Insurance	Location		
		Metro Wpg.	Table 3	Difference
a)	$50 000	$	$	$
b)	$140 000	$	$	$
c)	$85 000	$	$	$
d)	$65 000	$	$	$

9. Use the "Tenants and Condominium Owners Contents Package Rates Table" to answer the following questions on tenants' coverage.

	Basic Coverage	Location	Premium
a)	$15 000	Metro Wpg. $100 deductible	______
b)	$54 000	Outside Wpg. $50 deductible	______
c)	$10 000	Metro Wpg. $50 deductible	______
d)	$60 000	Metro Wpg. $100 deductible	______
e)	$20 000	Outside Wpg. $100 deductible	______

2. A condominium owner in Winnipeg wishes to insure his $80 000 condominium with a $100 deductible. What would be his annual premium?

10. 1. Calculate the loss paid by the insurance company when the following losses occur, assuming that all policies have an 80% co-insurance clause.

	Amount of Insurance	Property Value	Amount of Loss	
a)	$60 000	$75 000	$45 000	______
b)	29 000	35 000	5 000	______
c)	25 000	38 000	19 500	______
d)	40 000	48 000	42 000	______
e)	20 000	34 000	12 500	______
f)	38 000	59 000	30 000	______
g)	25 000	46 000	22 000	______
h)	16 000	26 000	5 000	______

2. David Stiller's office building is valued at $46 000 and is insured against fire for $43 000. If the fire destroys one room to the extent of $22 000, how much of the loss must the insurance company pay?

SELECT TABLE—BUILDING

(See Page PL23 for Eligibility)

FIRE AND EXTENDED COVERAGE

Net Premiums — not subject to Package Discount.

Amount of Insurance	[illegible]		Table 1		Table 2		Table 3	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20,000	36	32	36	31	46	41	70	63
22,500	40	36	39	34	49	44	76	68
25,000	44	40	42	38	52	47	81	72
27,500	47	42	46	40	57	51	88	80
30,000	52	47	49	44	64	58	96	88
32,500	58	52	56	50	72	65	107	96
35,000	65	58	63	57	77	69	119	107
37,500	72	66	71	64	86	77	129	116
40,000	78	70	78	70	95	85	139	125
42,500	85	76	86	77	103	93	149	134
45,000	94	85	93	84	111	100	160	144
47,500	103	99	100	90	119	107	170	153
50,000	106	94	106	94	127	114	180	162
55,000	114	103	114	103	140	126	201	181
60,000	123	111	123	111	153	138	222	200
65,000	134	121	132	119	166	149	243	219
70,000	143	129	141	127	179	161	264	238
75,000	152	137	150	135	192	173	285	256
Each add'l 2,500	9	8	9	8	13	12	21	19

[illegible]

SELECT TABLES—CONTENTS

(See Page PL23 for Eligibility)

FIRE AND EXTENDED COVERAGE

Net Premiums -- not subject to Package Discount.

Limit	[illegible]		Table 1		Table 2		Table 3	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8,000	16	15	15	13	18	16	27	24
9,000	20	18	16	14	20	18	29	26
10,000	21	19	17	15	21	20	31	28
11,000	22	20	18	16	24	22	35	32
12,000	23	21	20	18	29	26	38	35
13,000	25	22	23	21	32	29	41	37
14,000	26	25	27	24	33	30	45	40
15,000	30	27	29	26	36	31	48	44
16,000	33	30	32	29	38	34	53	48
17,000	36	32	35	31	40	36	56	52
18,000	39	35	38	34	43	39	62	56
19,000	42	38	41	37	47	42	66	60
20,000	45	40	43	39	51	46	70	63
Each Add. $1,000	3	3	3	3.	3	3	3	3

MANITOBA TENANTS PACKAGE TOWN GRADE 2 (Rural)

Amount of Insurance	Fire-Resistive Apartment Blocks		Dwellings and Apartments		Apartments in Commercial	
	1007	1011	1007	1011	1007	1011
$ 4,000	20	-	20	-	51	-
5,000	[illegible]	-	[illegible]	-	61	-
6,000	[illegible]	35	[illegible]	39	64	68
7,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	72
9,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	77
10,000	[illegible]	[illegible]	[illegible]	[illegible]	71	91
11,000	[illegible]	51	[illegible]	[illegible]	[illegible]	[illegible]
12,000	[illegible]	[illegible]	47	[illegible]	[illegible]	[illegible]
13,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14,000	[illegible]	[illegible]	51	[illegible]	[illegible]	[illegible]
15,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16,000	51	67	[illegible]	73	[illegible]	113
17,000	[illegible]	70	[illegible]	76	[illegible]	117
18,000	[illegible]	73	81	79	[illegible]	[illegible]
19,000	[illegible]	77	[illegible]	[illegible]	[illegible]	[illegible]
20,000	[illegible]	[illegible]	67	[illegible]	114	134
21,000	[illegible]	[illegible]	69	[illegible]	117	[illegible]
22,000	[illegible]	[illegible]	71	[illegible]	121	[illegible]
23,000	[illegible]	[illegible]	74	[illegible]	[illegible]	[illegible]
24,000	[illegible]	[illegible]	76	[illegible]	[illegible]	[illegible]
25,000	71	[illegible]	79	104	131	[illegible]
Each add'l $1,000	3	3	3	3	6	6

MANITOBA HOMEOWNERS TOWN GRADE 2 (Rural)

Amount of Building Insurance	Ded Opt. Loss	STANDARD		BROAD		[illegible]	
		[illegible]	Standard	[illegible]	Standard	[illegible]	Standard
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	201	211	226	[illegible]	[illegible]	[illegible]	[illegible]
Each Additional $1,000 Bldg.	2.50	3	3	3.25	3.75	[illegible]	[illegible]
Each Additional $1,000 Contents	2	2	2	2	2	2	2
[illegible] Outbuildings Per $1,000	1	1	1	1	1	1	1

1007 code for coverage

1011 more exclusive coverage

Wawanesa Mutual Insurance

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HOMEOWNER "STANDARD RATES" [illegible]

(STANDARD COVER WITH EXTENDED O.L.S.)

Limit	[illegible] $50 Ded	[illegible] $100 Ded	Table 1 $50 Ded	Table 1 $100 Ded	Table 2 $50 Ded	Table 2 $100 Ded	Table 3 $50 Ded	Table 3 $100 Ded
$ 25,000	92	83	86	77	111	100	131	118
27,500	97	87	90	82	117	104	144	130
30,000	101	91	95	86	122	110	158	143
32,500	109	98	104	94	135	122	172	154
35,000	116	103	110	99	143	129	184	165
37,500	118	107	115	103	152	136	196	176
40,000	123	111	118	106	154	139	205	184
42,500	131	119	124	112	164	148	217	195
45,000	136	123	130	117	170	153	226	203
47,500	144	129	137	124	178	161	237	213
50,000	149	134	143	129	186	177	244	219
55,000	159	143	158	140	204	184	271	244
60,000	174	156	173	155	226	205	301	271
65,000	190	170	184	166	248	224	328	295
70,000	217	195	200	183	274	246	360	324
75,000	237	213	220	198	303	273	397	357
80,000	253	228	236	212	324	292	423	380
85,000	269	242	251	226	346	311	450	405
90,000	285	258	268	241	368	331	476	430
95,000	303	273	283	255	386	345	507	457
100,000	313	287	297	268	408	367	533	480
105,000	333	294	315	283	434	391	556	500
110,000	355	320	333	300	460	414	597	538
115,000	374	336	351	316	486	437	630	567
120,000	391	354	369	332	511	460	663	596
125,000	411	370	386	347	537	483	695	626
130,000	421	386	404	364	563	506	727	654
135,000	447	432	421	379	589	530	760	684
140,000	465	419	440	396	614	552	792	713
145,000	481	435	458	412	640	576	824	741
150,000	501	452	476	428	667	600	856	770
Ea. Add. $5,000 -	19	17	17	16	26	23	33	30
CTS Ea. $1,000 -	3	3	3	3	5	5	6	6

- BASIC O.L.S. — REDUCE ABOVE PREMIUMS BY 10%.
- BROAD FORM — INCREASE ABOVE PREMIUMS BY 25%.
- SINGLE FAMILY OCCUPANCY — Use above premiums.
- TWO FAMILY DWELLINGS, Semi-Detached or Row Housing — Increase above premiums by 5%.

STANDARD TABLE—CONTENTS

FIRE AND EXTENDED COVERAGE

Net Premiums — not subject to Package Discount.

Limit	[illegible] $50 Ded	[illegible] $100 Ded	Table 1 $50 Ded	Table 1 $100 Ded	Table 2 $50 Ded	Table 2 $100 Ded	Table 3 $50 Ded	Table 3 $100 Ded
3,000	11	10	8	7	11	10	16	14
4,000	14	13	11	10	13	12	23	18
5,000	16	14	12	11	17	15	25	22
6,000	17	16	13	12	19	17	28	25
7,000	19	17	16	14	22	20	32	29
8,000	21	19	17	16	23	21	36	32
9,000	24	22	20	18	27	24	39	35
10,000	26	23	22	20	29	26	42	38
11,000	28	25	24	22	33	30	47	42
12,000	30	27	27	24	38	34	55	49
13,000	34	31	30	27	43	39	61	55
14,000	38	32	33	30	46	41	66	59
15,000	38	34	35	31	50	45	70	63
16,000	41	37	39	35	53	48	73	66
17,000	43	39	42	38	56	50	78	71
18,000	44	40	43	39	61	55	83	75
19,000	47	42	46	40	64	58	88	80
20,000	52	47	50	45	66	60	93	84
Each Add. $2,000	4	4	4	4	4	4	4	4

HOMEOWNER "SELECT RATES"

(STANDARD COVER WITH EXTENDED O.L.S.)

Limit	[illegible] $50 Ded	[illegible] $100 Ded	Table 1 $50 Ded	Table 1 $100 Ded	Table 2 $50 Ded	Table 2 $100 Ded	Table 3 $50 Ded	Table 3 $100 Ded
40,000	108	97	101	91	126	113	167	150
42,500	116	104	107	96	132	119	176	158
45,000	120	108	111	100	138	124	183	165
47,500	127	114	117	105	144	130	191	172
50,000	132	119	122	110	151	136	199	179
55,000	149	134	134	121	167	150	221	199
60,000	162	146	149	134	186	167	244	220
65,000	174	157	159	143	202	182	267	240
70,000	192	173	173	156	222	200	292	263
75,000	211	190	190	171	246	221	322	290
80,000	223	201	203	183	262	236	343	309
85,000	239	215	216	194	281	253	367	330
90,000	257	231	231	208	298	268	389	350
95,000	269	242	241	217	312	281	412	371
100,000	283	255	257	231	331	298	434	391
105,000	300	270	273	246	352	317	461	415
110,000	316	284	287	258	373	336	487	438
115,000	331	298	302	272	394	355	513	462
120,000	348	313	318	286	416	374	539	485
125,000	363	327	332	299	437	393	566	509
130,000	380	342	349	314	458	412	591	532
135,000	396	356	361	325	478	430	618	556
140,000	412	371	379	341	498	449	643	579
145,000	428	385	394	355	520	468	670	603
150,000	444	400	410	369	541	487	696	626
Each Add. $5,000 -	16	14	15	13	21	19	26	23
CTS/ Each $1,000 -	3	3	3	3	4	4	5	4

- BASIC O.L.S. — REDUCE ABOVE PREMIUMS BY 10%.
- BROAD FORM — INCREASE ABOVE PREMIUMS BY 25%.
- SINGLE FAMILY OCCUPANCY — Use above premiums.
- TWO FAMILY DWELLINGS, Semi-Detached or Row Housing — Increase above premiums by 5%.

STANDARD TABLE—BUILDING

FIRE AND EXTENDED COVERAGE

Net Premiums — not subject to Package Discount.

Limit	[illegible] $50 Ded	[illegible] $100 Ded	Table 1 $50 Ded	Table 1 $100 Ded	Table 2 $50 Ded	Table 2 $100 Ded	Table 3 $50 Ded	Table 3 $100 Ded
10,000	29	26	29	25	40	36	64	58
12,500	36	32	34	31	48	43	71	64
15,000	42	38	40	36	55	49	80	72
17,500	47	42	44	40	60	54	90	81
20,000	50	45	48	43	64	58	97	87
22,500	54	49	52	47	68	61	104	94
25,000	59	53	56	50	71	64	111	100
27,500	66	59	62	56	80	72	121	109
30,000	74	67	70	63	90	81	135	121
32,500	83	75	80	72	103	93	149	134
35,000	89	80	88	76	111	100	156	142
37,500	97	87	96	86	121	109	172	155
40,000	103	93	103	93	131	118	186	167
45,000	123	111	121	109	155	139	218	196
50,000	142	128	142	128	178	160	248	223
55,000	154	138	154	139	202	182	282	254
60,000	166	149	166	149	226	203	316	284
65,000	178	160	178	160	250	225	350	315
70,000	190	171	190	171	274	247	384	346
75,000	202	182	202	182	298	268	418	376
Each Add. 5,000	12	11	12	11	24	22	34	31

BASIC O.L.S. — REDUCE ABOVE PREMIUMS 10%.

(NPIC Tables)

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TENANTS AND CONDOMINIUM OWNERS
CONTENTS PACKAGE RATES

For tenants of private dwellings and apartments (other than rooming houses or risks situated in buildings containing a commercial occupancy).

	TENANTS				CONDOMINIUM OWNERS			
Limit	Frame Dwelling		All Other Types		Frame Dwelling		All Other Types	
	$50 Ded.	$100 Ded.	$50 Ded.	$100 Ded.	$50 Ded.	$100 Ded.	$50 Ded.	$100 Ded.
7,000	54	49	44	40	—	—	—	—
8,000	57	51	48	43	—	—	—	—
9,000	59	53	51	46	—	—	—	—
10,000	61	55	54	48	—	—	—	—
11,000	63	57	58	52	—	—	—	—
12,000	66	59	61	55	—	—	—	—
13,000	68	61	64	58	—	—	—	—
14,000	70	63	67	60	—	—	—	—
15,000	72	65	70	63	66	59	63	57
16,000	74	67	73	66	68	61	66	59
17,000	78	70	76	68	70	63	69	62
18,000	80	72	79	71	72	65	71	64
19,000	83	75	83	75	76	68	76	68
20,000	86	77	87	78	78	70	79	71
22,000	92	83	94	85	84	76	87	78
24,000	99	89	102	92	91	82	94	85
26,000	105	95	110	99	98	88	102	92
28,000	112	101	118	106	104	94	110	99
30,000	119	107	126	113	111	100	118	106
35,000	136	122	142	128	128	115	134	121
40,000	152	137	159	143	144	130	151	136
45,000	169	152	176	158	161	145	168	151
50,000	186	167	192	173	178	160	184	166
Each Add. $1,000	3	3	3	3	3	3	3	3

Note: Some homeowner's policies base the amount of each type of protection as a percent of the amount of insurance on the dwelling itself. (Refer to Table.)

COVERAGE	MINIMUM AMOUNT
(1) Dwelling Building	100% of building $20,000
(2) Outbuildings, including Fences, Flag Poles, Walks	10% of Building
(3) Trees, Shrubs, Plants	5% of Building Maximum $250 per Item
(4) Household Contents, Fire & Theft	40% of Building
(5) Off Premises Theft	10% of Building or $1,500 per Occurrence
(6) Additional Living Expense	20% of Building

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Automobile Insurance

Included in this section are 1983 Premiums Table for Territories 1 and 2 and V.I.C. Tables are for vehicles of three different auto makers.

It is suggested that the teacher attempt to get up-to-date tables for this section and revise the questions as necessary.

1983 AUTOPAC PREMIUMS TERRITORY 1

TIME PAYMENT ADMINISTRATION FEE
$8.00

PASSENGER CARS (CLASS A-1)

INSURANCE USE	CODES	All Perils Deduct.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	THIRD PARTY LIABILITY AND UNDERINSURED MOTORIST 300,000 3/C	500,000 4/D	1,000,000 5/E	2,000,000 6/F
			RATING GROUPS							(PER VIC TABLES)										
PREFERRED (01)	9	BASIC $200	106	137	153	165	175	190	207	226	249	296	312	327	343	357	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	21	27	30	36	43	47	54	60	66	73	73	73	73	73				
	4	$50	29	43	47	54	61	68	82	91	99	110	110	110	110	110				
ALL PURPOSE (02)	9	BASIC $200	154	199	215	229	245	263	285	306	338	401	423	444	464	486	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	21	27	30	36	43	47	54	60	66	73	73	73	73	73				
	4	$50	29	43	47	54	61	68	82	91	99	110	110	110	110	110				
FARMER (04)	9	BASIC $200	89	113	122	129	139	150	159	172	187	221	233	244	255	266	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	21	27	30	36	43	47	54	60	66	73	73	73	73	73				
	4	$50	29	43	47	54	61	68	82	91	99	110	110	110	110	110				
LEASE (03) OR BUSINESS (15)	9	BASIC $200	180	237	262	280	303	330	359	386	427	508	536	564	591	617	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	22	29	35	39	47	50	60	66	73	80	80	80	80	80				
	4	$50	32	47	50	60	67	75	89	99	110	121	121	121	121	121				

DELIVERY CARS (CLASS A-2)

INSURANCE USE	CODES	All Perils Deduct.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	300,000 3/C	500,000 4/D	1,000,000 5/E	2,000,000 6/F
DELIVERY CAR (37)	9	BASIC $200	253	320	345	369	395	427	459	489	541	644	679	712	748	782	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	22	29	35	39	47	50	60	66	73	80	80	80	80	80				
	4	$50	32	47	50	60	67	75	89	99	110	121	121	121	121	121				

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FARM TRUCKS (CLASS A-6)

Fee to increase Maximum Insured Value over $15,000—$10 per $1,000 of Declared Excess Value

INSURANCE GROUPING	CODES	ALL PERILS DEDUCT	1982 OR LATER	1977 TO 1981	1970 TO 1976	1968 AND 1969	1965 TO 1967	1960 TO 1964	1959 AND PRIOR	300,000	500,000	1,000,000	2,000,000
UP TO 3630 kg. (14)	9	BASIC $200	173	135	105	96	91	88	77	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	25	25	20	20	20	20	20				
	4	$50	32	32	25	25	25	25	25				
3631 TO 9080 kg. (14)	9	BASIC $200	166	152	138	126	113	105	97	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	27	27	22	22	22	22	22				
	4	$50	37	37	30	30	30	30	30				
OVER 9080 kg. (14)	9	BASIC $200	179	166	150	137	126	115	106	3 / 4	6 / 6	12 / 10	21 / 15
	5	$100	32	32	27	27	27	27	27				
	4	$50	44	44	37	37	37	37	37				

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1983 AUTOPAC PREMIUMS

TERRITORY 2

TIME PAYMENT ADMINISTRATION FEE
$8.00

PASSENGER CARS (CLASS A-1)

INSURANCE USE	CODES	All Perils Deduct	RATING GROUPS (PER VIC TABLES) 0	1	2	3	4	5	6	7	8	9	A	B	C	D	THIRD PARTY LIABILITY AND UNDERINSURED MOTORIST 300,000 3/C	500,000 4/D	1,000,000 5/E	2,000,000 6/F
PREFERRED (01)	9	BASIC $200	72	102	121	124	138	147	169	190	209	247	260	272	285	297	3	6	12	21
	5	$100	20	25	29	35	41	46	53	58	64	71	71	71	71	71				
	4	$50	27	41	46	53	58	67	77	88	96	106	106	106	106	106	4	6	10	15
ALL PURPOSE (02)	9	BASIC $200	89	133	148	160	169	190	208	231	251	299	314	328	345	360	3	6	12	21
	5	$100	20	25	29	35	41	46	53	58	64	71	71	71	71	71				
	4	$50	27	41	46	53	58	67	77	88	96	106	106	106	106	106	4	6	10	15
FARMER (04)	9	BASIC $200	61	88	99	108	115	124	137	151	165	196	205	216	225	237	3	6	12	21
	5	$100	20	25	29	35	41	46	53	58	64	71	71	71	71	71				
	4	$50	27	41	46	53	58	67	77	88	96	106	106	106	106	106	4	6	10	15
LEASE (03) OR BUSINESS (19)	9	BASIC $200	121	188	212	232	252	274	306	338	371	442	465	490	513	536	3	6	12	21
	5	$100	21	27	32	37	46	49	58	64	71	77	77	77	77	77				
	4	$50	29	46	49	58	64	74	87	96	106	117	117	117	117	117	4	6	10	15

DELIVERY CARS (CLASS A-2)

INSURANCE USE	CODES	All Perils Deduct	0	1	2	3	4	5	6	7	8	9	A	B	C	D	300,000 3/C	500,000 4/D	1,000,000 5/E	2,000,000 6/F
DELIVERY CAR (37)	9	BASIC $200	138	202	232	249	267	293	321	352	387	461	485	511	534	558	3	6	12	21
	5	$100	21	27	32	37	46	49	58	64	71	77	77	77	77	77				
	4	$50	29	46	49	58	64	74	87	96	106	117	117	117	117	117	4	6	10	15

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FARM TRUCKS (CLASS A-6)

Fee to increase Maximum Insured Value over $15,000—$10 per $1,000 of Declared Excess Value

INSURANCE GROUPING	CODES	ALL PERILS DEDUCT	1982 OR LATER	1977 TO 1981	1970 TO 1976	1968 AND 1969	1965 TO 1967	1960 TO 1964	1959 AND PRIOR	300,000	500,000	1,000,000	2,000,000
UP TO 3630 kg. (14)	9	BASIC $200	123	95	63	54	49	43	35	3	6	12	21
	5	$100	22	22	16	16	16	16	16				
	4	$50	29	29	22	22	22	22	22	4	6	10	15
3631 TO 9080 kg. (14)	9	BASIC $200	88	74	60	51	45	39	36	3	6	12	21
	5	$100	22	22	18	18	18	18	18				
	4	$50	27	27	21	21	21	21	21	4	6	10	15
OVER 9080 kg. (14)	9	BASIC $200	92	79	63	58	51	46	42	3	6	12	21
	5	$100	27	27	20	20	20	20	20				
	4	$50	30	30	25	25	25	25	25	4	6	10	15

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T/P Liability & Underinsured Code Alpha

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1983 V.I.C. TABLE	A-1 PASSENGER CAR A-2 DELIVERY CAR (ADD 8.00 TO REGISTRATION FEE SHOWN)	FORD FALCON TO FORD GALAXIE LTD	PAG 59

*IF BODY STYLE IS ROADSTER, VAN, CONVERTIBLE OR STATION WAGON ADD 1 TO RATING GROUP—EXCEPT 8,9,A,B,C or D

VEHICLE DESCRIPTION

MAKE AND MODEL	NO. OF CYL.	V.I.C.	RATING GROUPS AND REGISTRATION FEES																					
			MODEL YEAR																					
			84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63 Prior
FORD FALCON															2	0	0	0	0	0	0	0
* CONVERT.	6	AT961A																		22	21	19
* CONVERT.	8	AT961A																			22	
- 2 DOOR	6	AT962A													22	22	21	21	21	19	20	19
- 2 DOOR	8	AT962A													24	23	23	24	24	22	21	19
* ST. WAGON	6	AT963A													26	26	25	26	26	22	22	18
* ST. WAGON	8	AT963A													26	27	27	28	29	25	24	19
- 4 DOOR	6	AT964A													22	22	21	21	21	20	20	19
- 4 DOOR	8	AT964A													24	24	23	24	24	22	22	19
FORD FALCON DELUXE																			0	0		0
- 2 DOOR	6	AT662D																	21			
* ST. WAGON	6	AT663D																		22		
* ST. WAGON	8	AT663D																		25		
- 4 DOOR	6	AT664D																	21			19
FORD FALCON FUTURA															2	0	0	0	0	0	0	0
* CONVERT.	6	AT861B																		22	21	19
* CONVERT.	8	AT861B																		23	22	19
- 2 DOOR	6	AT862B													22	22	21	21	21	19	20	19
- 2 DOOR	8	AT862B													24	23	23	24	24	22	22	19
* ST. WAGON	6	AT863B													26	26	25	26	26	22		
* ST. WAGON	8	AT863B													26	27	27	28	29	25		
- 4 DOOR	6	AT864B													22	22	22	21	21	20	20	19
- 4 DOOR	8	AT864B													24	24	23	24	24	23	22	19
FORD FALCON SQUIRE																				0	0	0
- 2 DOOR	8	AT782C																			24	
* ST. WAGON	6	AT783C																				
* ST. WAGON	8	AT783C																		25	24	
FORD FALCON VAN																		0			0	0
* VAN	6	AYF6A4																19			19	19
FORD FIESTA						8	6	6	6													
- 2 DOOR	4	AR742C				19	19	19	19													
- 4 DOOR	4	AR744C						19	19													
FORD FRONTENAC																						0
- 2 DOOR	6	AR562E																				19
* ST. WAGON	6	AR563E																				19
- 4 DOOR	6	AR564E																				19
FORD GALAXIE																					0	0
* CONVERT.	6	ARC817																				19
* CONVERT.	8	ARC817																			34	19
- 2 DOOR	6	ARC827																				19
- 2 DOOR	8	ARC827																			32	19
* ST. WAGON	6	ARC837																			33	
* ST. WAGON	8	ARC837																			34	19
- 4 DOOR	6	ARC847																			32	19
- 4 DOOR	8	ARC847																			34	19
* ROADSTER	8	ARC877																				19
FORD GALAXIE LTD											6	5	5	5	4	4	2	1	6	0	0		
- 2 DOOR	8	ARK82Y										38				32	31	31	33				
* ST. WAGON	8	ARK83Y										43	38	36				34					
- 4 DOOR	6	ARK84Y																			32		
- 4 DOOR	8	ARK84Y									49	38	38	38	34	32	31		32	33	33		

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1983 V.I.C. TABLE	A-1 PASSENGER CAR A-2 DELIVERY CAR (ADD 8.00 TO REGISTRATION FEE SHOWN)	DODGE CORONET SUPERBEE TO DODGE DART GTS	PAGE 43

*IF BODY STYLE IS ROADSTER, VAN, CONVERTIBLE OR STATION WAGON ADD 1 TO RATING GROUP—EXCEPT 0,9,A,B,C or D

VEHICLE DESCRIPTION			RATING GROUPS AND REGISTRATION FEES																					
			MODEL YEAR																					
MAKE AND MODEL	NO. OF CYL.	V.I.C.	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63 Prior
DODGE CORONET SUPERBEE																	3	0	0					
- 2 DOOR	8	BAF824															29	30	30					
DODGE CORONET TAXI													4	4	3			0	0					
- 4 DOOR	6	BAK64Y											31	29	29			32	32					
- 4 DOOR	8	BAK84Y											32	30	30			33	33					
DODGE CORONET 440													4		3	3	3	0	0	0	0			
* CONVERT.	6	BAC617																		26	26			
* CONVERT.	8	BAC817																		29	28			
- 2 DOOR	6	BAC627														27	26	26	25	27	25			
- 2 DOOR	8	BAC827														27	26	27	27	29	27			
* ST. WAGON	6	BAC637															30	31	29	31	30			
* ST. WAGON	8	BAC837													32		31	32	30	32	31			
- 4 DOOR	6	BAC647											30				26	26	25	27	25			
- 4 DOOR	8	BAC847													28		27	28	27	28	27			
DODGE CORONET 500																3	3	0	0	0	0			
* CONVERT.	8	BAD816															28	29	28	30	28			
- 2 DOOR	6	BAD626																26			28			
- 2 DOOR	8	BAD826															27	28	27	29	28			
* ST. WAGON	6	BAD636																31						
* ST. WAGON	8	BAD836															31	32	31					
4 DOOR	6	BAD646															26							
4 DOOR	8	BAD846														28	27	28	27	29				
DGE CUSTOM 880																								0
* ST. WAGON	8	A7983A																						19
DODGE DART											5	4	4	3	3	2	2	0	0	0	0	0	0	0
* CONVERT.	6	BCA619																24	23	24			29	
* CONVERT.	8	BCA819																24	25	26				
- 2 DOOR	6	BCA629									24	24	24	23	23	24	23	23	22	23	21	21	25	19
- 2 DOOR	8	BCA829									27	26	26	25	23	24	24	25	24	25	34	22	30	19
* ST. WAGON	6	BCA639																						19
* ST. WAGON	8	BCA839										36											31	19
- 4 DOOR	6	BCA649									25	25	25	24	23	24	23	24	22	23	23	31	25	19
- 4 DOOR	8	BCA849									27	27	26	25	23	24	24	25	24	25	27	33	28	19
DODGE DART CUSTOM											5	4	4	3	3	2	2	0	0	0				
- 2 DOOR	6	BCK62Y														23	23	23	22	23				
- 2 DOOR	8	BCK82Y														24	24	25	24					
- 4 DOOR	6	BCK64Y									25	25	25	24	23	24	23	24		23				
- 4 DOOR	8	BCK84Y										27	26	25	23	24	24	25						
DODGE DART DEMON														3	3	2								
- 2 DOOR	6	BCL62X												23	23	23								
- 2 DOOR	8	BCL82X												24	23	24								
DODGE DART DEMON 340															3	3								
- 2 DOOR	8	BCM82W													26	26								
DODGE DART GT													4			2	2	0	0	0				
* CONVERT.	6	BCF614																	23	24				
* CONVERT.	8	BCF814																26	25	26				
2 DOOR	6	BCF624															23	23	22	23				
2 DOOR	8	BCF824											26			24	24	25	24	25				
DGE DART GTS																		0	0					
* CONVERT.	8	BCG813																28	27					
- 2 DOOR	8	BCG823																27	26					

1983 V.I.C. TABLE

A-1 PASSENGER CAR
A-2 DELIVERY CAR (ADD 8.00 TO REGISTRATION FEE SHOWN)

CHEV MONZA SPORT
TO
CHEV SUBURBAN 115

PAGE
23

*IF BODY STYLE IS ROADSTER, VAN, CONVERTIBLE OR STATION WAGON ADD 1 TO RATING GROUP—EXCEPT 0,9,A,B,C or D

VEHICLE DESCRIPTION

MAKE AND MODEL	NO. OF CYL.	V.I.C.	RATING GROUPS AND REGISTRATION FEES																					
			MODEL YEAR																					
			84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63 Prior
CHEV MONZA SPORT							8	8	7															
- 2 DOOR	4	ABC427					22	22	21															
- 2 DOOR	6	ABC627					23	23	22															
- 2 DOOR	8	ABC827					24	24	23															
CHEV MONZA 2+2									7	7	6	5												
- 2 DOOR	4	AA442F							24	24	22	20												
- 2 DOOR	6	AA462F							27															
- 2 DOOR	8	AA482F							28	28	25	23												
CHEV NOMAD															3	3								0
- 2 DOOR	6	AAR62P																						19
* ST. WAGON	6	AAR63P													32	31								19
* ST. WAGON	8	AAR83P													33									19
- 4 DOOR	6	AAR64P																						19
- AMBULANCE	8	AAR88P																						49
CHEV NOVA								7	6	6	5	4	4	3	3	2	2	0	0	0	0	0	0	0
- 2 DOOR	6	AAM62W						26	26	26	27	28	27	26	25	24	24	23	23	22	21	21	21	19
- 2 DOOR	8	AAM82W						27	28	28	29	30	28	27	26	25	25	25	24	24	23	23		
* ST. WAGON	6	AAM63W																		25		23	24	19
* ST. WAGON	8	AAM83W																		26		25		
- 4 DOOR	6	AAM64W						27	26	26	28	29	27	26	25	24	24	24	23	22	21	21	21	19
- 4 DOOR	8	AAM84W						28	27	27	29	30	29	28	26	25	25	25	25	24	23	23	22	
EV NOVA CONCOURS										6	5													
- 2 DOOR	6	ACJ621								27	29													
- 2 DOOR	8	ACJ821								29	30													
- 4 DOOR	6	ACJ641								28	29													
- 4 DOOR	8	ACJ841								29	30													
CHEV NOVA CUSTOM								7	6		5	4	4	3										
- 2 DOOR	6	ACH622						27	27		29	29	28	28										
- 2 DOOR	8	ACH822						28	28		30	30	29	28										
- 4 DOOR	6	ACH642						27	27		29	29	28	27										
- 4 DOOR	8	ACH842						28	28		31	30	29	28										
CHEV NOVA LN											6	5												
- 2 DOOR	6	ACG623									27	29												
- 2 DOOR	8	ACG823									29	30												
- 4 DOOR	6	ACG643									29	30												
- 4 DOOR	8	ACG843									30	30												
CHEV PARKWOOD																	3							0
- 2 DOOR	8	AAP82R																						
* ST. WAGON	6	AAP63R															32							19
* ST. WAGON	8	AAP83R																						19
CHEV P30 VAN 125WB									8															
* VAN	8	AD68AD							28															
CHEV SUBURBAN															3	3	3	0	0		0	0		
* CONVERT.	6	AA261H													32	33	33	31	34		30	30		
* CONVERT	8	AA281H													34	33	33	33	42					
* ST. WAGON	6	AA263H													32	33	33	31	34		30	30		
* ST. WAGON	8	AA283H													34	33	33	33	38					
* ROADSTER	6	AA267H													32	33	33	31	34		30	30		
* ROADSTER	8	AA287H													34	33	33	33	42					
HEV SUBURBAN 115																					0	0		0
* VAN	6	ALR6AP																			30	30		19

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12. I. Calculate the total premium for each of the following situations:

Territory	VEHICLE	YEAR	CYLINDERS	TYPE	INSURANCE USE	ALL PERILS DEDUCTIBLE	TIP LIABILITY	UNDER-INSURED MOTORIST COVERAGE	TOTAL ANNUAL PREMIUM
1	Ford Falcon	69	6	Station Wagon	All-Purpose	Basic	$500 000	No	
2	Dodge Dart	76	8	4 Door	Preferred	$100	$1 000 000	Yes	
1	Chev. Nova Custom	79	8	2 Door	Business	$100	$2 000 000	No	
1	Chev. Monza Sport	79	8	2 Door	Lease	$200	$500 000	No	
2	Dodge Coronet 440	70	6	Station Wagon	Preferred	$200	$300 000	Yes	
1	Ford Fiesta	80	4	2 Door	All-Purpose	$100	$500 000	Yes	
2	Chev Monza 2 + 2	78	6	2 Door	Preferred	$100	Basic	No	
1	Dodge Dart GT	74	8	2 Door	Preferred	Basic	$300 000	No	
1	Ford Galaxie LTD	74	8	Station Wagon	Farm	Basic	$1 000 000	Yes	
2	Dodge Coronet 500	70	8	4 Door	Preferred	Basic	Basic	No	

13. The following questions are intended to provide a starting point for this section.

1. Jim Jackson owns a 1979 Fiesta 2-door. He wishes to purchase $1 000 000 liability insurance and get the Underinsured Motorist Protection. He will purchase a $100 All-Perils Deductible. How much would he save yearly in insurance by buying preferred insurance and taking the bus to work versus taking his car to work? Are there other factors Jim should consider? Note that Jim lives in Territory #1.

2. Ron and Jim Wilson both purchased 1980 Chev-Monza Sport 2-Door 6-cylinder vehicles from a dealer. They both decided on a $100 deductible with $2 000 000 Third Party Liability and Underinsured Motorist Protection. Ron lives in Winnipeg while Jim lives in a rural town. Calculate the difference in premiums paid by the two. (Both Wilsons purchase all-purpose insurance.)

3. Fred Farmer owns a farm in Territory 2. He owns a 1978 Chev Nova Custom 4-Door 8-cylinder. He purchased all-purpose insurance with $1 000 000 Third Party Liability, the Underinsured Motorist Protection and a $100 All-Perils Deductible. How much money would Fred have saved if he had purchased farm use insurance for his car instead of all-purpose insurance? When can a farmer not purchase this type of insurance?

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4. Slick Salesman drives his car for business purposes. Slick, however, decided to insure his vehicle (a 1981 Ford Fiesta 2-Door) with $100 deductible $1 000 000 Third Party Liability Insurance and the Underinsured Motorist Coverage in Territory I with all-purpose. How much money is Slick saving each year? What is wrong with such a practice?

Insurance Review Questions

Where required, use the insurance tables provided in this unit.

1. Calculate the annual premium for a person at the age of 31 who wanted to take out a 15-year term insurance for $95 000.

2. Find the annual premium on a $50 000 whole-life policy issued at age 21 for premiums payable semi-annually, quarterly, and monthly.

3. A straight life insurance policy costs $11.35 per thousand per year.

   a) How much would the annual premium be for a $15 000 policy?

   b) How much would have been paid to the insurance company after 11 years?

4. How much more will the premiums be on a $10 500 endowment policy to age 65, issued at age 35, than on an endowment life policy to age 60?

5. How much will Casey save each year on his $20 000, 15-year term policy by making annual payments rather than quarterly payments? (The policy was issued at age 40.)

6. How much will an insurance company pay for a loss of $26 000 on a building valued at $40 000, if it is insured for $24 000 with an 80% co-insurance clause?

7. An individual decides to buy fire and extended insurance on her home. She decided to buy $45 000 insurance on the building plus $10 000 coverage on the contents. If she lives in an area classified as Table I, what would be the premium if she fell into the select category with $100 deductible?

8. A homeowner decides to purchase a homeowner's policy for $200 000. If he is categorized as fitting under Table 3, what would be his annual premium if he is in the standard category with a $100 deductible?

9. Fearless Frank's office building is valued at $90 000 and is insured against fire for $60 000. If fire destroys part of the building to the extent of $30 000, what amount of money would Frank receive if the insurance contract contained an 80% co-insurance clause?

10. Chris Johnson owns a 1975 Ford Galaxie LTD 4-door with an 8-cylinder engine. Calculate his total premium if he lives in Winnipeg, takes his car to work, wishes to purchase $1 000 000 Third Party Liability insurance and the Underinsured Motorist Protection with a $100 deductible.

11. John James owns a farm in Territory 2. He owns a 1980 Chev Monza Sport 2-door with an 8-cylinder engine. He purchased all-purpose insurance with $2 000 000 Third Party Liability, the Underinsured Motorist Protection, and a $100 All-Perils Deductible. He could have insured his vehicle under the Farm Car Use Category. How much would John have saved if he had purchased farm insurance instead of all-purpose insurance?

12. A woman purchases a $50 000 whole-life policy at age 30. What would be her quarterly payment?

13. At age 35, how much 10-year term insurance could be purchased for an annual premium of $764.40?

D. MORTGAGES

Note: The section on property taxes should be covered before starting mortgages, due to calculations of taxes on mortgaged property. The following project may be used to introduce this module.

1. 1. Prices of homes have increased steadily and it is often stated that home ownership is one of the better investments in our economy. Make a comparison for each of the past five years of the average costs of the following by contacting your local real estate agent (or board).

a) a new home
b) an old home resale
c) monthly rent for an apartment
d) monthly rent for a townhouse
e) monthly rent for a condominium

2. a) What has been the average increase in the price of a new home in the past five years?
   b) What has been the percentage increase in the price of a new home in the past five years?

3. a) What has been the average increase in the price of an old home resale in the past five years?
   b) What has been the percentage increase in the price of an old home resale in the past five years?

2. 1. Casey and Evelyn bought a house from Mr. Jones for $85 500. They had only $15 000 for a down payment and had to take over the existing mortgage of $49 700 at 12 1/2%, held by the Bank of Montreal. They acquired the remainder of the purchase price by taking out another mortgage with Mr. Charles at 21%.

a) Define a mortgage.
b) Who is the mortgagor?
c) Who is the first mortgagee?
d) Who is the second mortgagee?
e) What is the amount of the second mortgage?
f) What is the interest rate on the first mortgage?
g) What is the interest rate on the second mortgage?
h) Why is one mortgage rate higher than the other?

3 1. Alvin bought a home for $32 000. He paid $26 000 down and gave the seller a $6 000, 8-year mortgage at 18%. The mortgage was dated August 1st, year 1. Alvin was to make regular yearly payments of $750 plus interest on the unpaid balance beginning on July 31st, year 2. Prepare a schedule of mortgage payments for the 8 years.

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

2. Prepare an amortization schedule for the first payments from the following information:

Date of mortgage, March 1
Amount of Mortgage on March 1, $26 000
Monthly payments on the principal, $250 beginning March 31
Interest on the mortgage, 19 3/4%

a) How much interest is paid in the first 6 months?
b) How much principal is paid in the first 6 months?
c) How long will it take to pay off the mortgage?

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

3. Lorin bought a $65 000 property for $15 000 down and signed a mortgage, agreeing to pay the remainder of the purchase price by equal quarterly payments of $500 on principal plus interest on the unpaid balance at 22 1/2%.

   a) Prepare a schedule to show Lorin's payments for the first two years.
   b) How much will Lorin still owe at the end of 10 years?
   c) How long will it take Lorin to pay the debt completely?

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

4. Prepare an amortization schedule for the first 6 payments, using the following information:

Date of mortgage, August 15
Amount of mortgage on August 15, $25 000
Monthly payments on the principal, $320 beginning September 15
Interest on the mortgage, 18 3/4% per annum
Down payment, $20 000

a) How much interest was paid in the first 6 months?
b) How much principal was paid in the first 6 months?
c) How long will it take to pay off the mortgage?
d) What will the owner's equity be at the end of 5 years?

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

3b-i

1. A home was purchased for $65 000. The buyer made a down payment of $27 000 with the balance of the purchase price to be mortgaged over 30 years. Regular monthly payments of $685.00 are to be made beginning January 15. The interest rate is 19 3/4% per annum. Prepare an amortization schedule for the first 6 payments.

   a) How much interest was paid in the first 6 months?
   b) How much principal was paid in the first 6 months?

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

3(b)-ii.

1. Using an amortization table, find the equal monthly payment required to amortize the following mortgages.

	Amount of Mortgage	Rate of Interest	Amortization Period	Monthly Payment
a)	$6 000	12%	5 years	
b)	42 200	14 1/4%	10 years	
c)	64 500	16 1/2%	20 years	
d)	22 000	10%	15 years	
e)	95 500	11 3/4%	18 years	
f)	120 500	12 3/4%	30 years	
g)	73 400	17 1/2%	17 years	
h)	80 000	10 1/4%	25 years	

2. Jim Johnson and his wife have saved $10 000 in a Registered Home Ownership Savings Plan. They decide to purchase a $72 000 home in St. Vital. What would be their monthly payment if they choose a 25-year amortization period with an annual percent rate of 13 1/2%?

3. Wayne Newton has just been told by his banker that he should consider reducing his $50 000 mortgage amortization period from 25 years to 20 years. Both would have an interest rate of 13 1/2%.
    a) What is his monthly mortgage payment with a 25-year amortization period?
    b) What would be his monthly mortgage payment if he went to a 20-year amortization period?
    c) Calculate the difference between the total amount paid over a 20-year period and the 25-year period.

4. The Smiths wish to purchase a $90 000 home. They are able to arrange a $67 000 mortgage at the bank of 10 1/2%. Unfortunately, the Smiths only have a $10 000 down payment and must get a second mortgage for the balance owing at 14%. What would be their total monthly payment if they decided on a 25-year amortization period?

5. During a recent period of high interest rates, the Mattsons signed a two-year mortgage for $50 000 at 18% interest for 25 years. Interest rates later fell to 13 1/4%. Assuming the same principal and the same amortization period, calculate the extra amount Mattsons was paying per month at the higher rate.

Note: "Amortization Table" on p. 54.

6. A $72 000 home was purchased July 1. The buyer made a $30 000 down payment and gave a 10-year mortgage for the balance of the purchase price, which was to be paid in equal monthly payments, beginning August 1. The interest rate was 14 1/2% per annum.

   a) Find the equal monthly payment.
   b) Prepare an amortization schedule for the first 7 payments.

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

7. Vic and Agnes had a $15 000, 15-year mortgage at 15 1/2%, payable in equal monthly installments.

   a) What was their monthly payment?
   b) What was the interest on the first payment?

8. Property was purchased for $42 000 on which a $25 000 down payment was made, with the remainder to be paid back in equal monthly payments, including principal and interest, at 13 1/2% over 10 years.

   a) What was the monthly payment?
   b) What was the interest on the first payment?
   c) How much will be paid in 10 years?
   d) What will be the total amount of interest paid after the last payment is made?

9. Ed purchased a piece of property for $42 000. Under the sales terms, $12 000 was required as a down payment with the remainder to be paid under a 25-year mortgage at 12% per annum.

   a) Calculate the equal monthly payment required to pay off the the mortgage.
   b) How much would Ed pay to the mortgagee over the life of the mortgage?

10. Audrey purchases a home valued at $83 000. She is required to make a $15 000 down payment with the balance to be paid off on mortgages. The first mortgage, which her father agrees to hold, is valued at $55 000, bears interest at the rate of 10% per annum and is to be repaid monthly over a period of 30 years. The second mortgage for the balance is a 16 3/4% mortgage to be paid over 10 years.

    a) What is her monthly payment for the first mortgage?
    b) What is her monthly payment to cover the second mortgage?
    c) How much will she pay for the home over the 30-year period, including her own payment?

AMORTIZATION TABLE

INTEREST TABLE

MONTHLY PAYMENTS INCLUDING PRINCIPLE AND INTEREST.
FOR A LOAN OR MORTGAGE OF $1,000.

# Yrs.	10%	10¼%	10½%	10¾%	11%	11¼%	11½%	11¾%	12%	12¼%	12½%
5	$21.25	21.38	21.50	21.62	21.75	21.87	22.00	22.12	22.25	22.38	22.50
10	13.22	13.36	13.50	13.64	13.78	13.92	14.06	14.21	14.35	14.50	14.64
12	11.95	12.10	12.25	12.39	12.54	12.69	12.84	12.99	13.14	13.29	13.44
15	10.75	10.90	11.06	11.21	11.37	11.53	11.69	11.85	12.01	12.17	12.33
16	10.46	10.62	10.78	10.94	11.10	11.26	11.42	11.59	11.74	11.91	12.07
17	10.21	10.38	10.54	10.71	10.86	11.02	11.19	11.35	11.52	11.68	11.85
18	10.00	10.16	10.33	10.49	10.66	10.82	10.99	11.16	11.32	11.49	11.67
19	9.81	9.98	10.15	10.31	10.48	10.65	10.82	10.99	11.16	11.33	11.50
20	9.65	9.82	9.98	10.16	10.33	10.50	10.67	10.84	11.02	11.19	11.37
21	9.51	9.68	9.85	10.02	10.19	10.37	10.54	10.72	10.89	11.07	11.25
22	9.38	9.56	9.73	9.90	10.06	10.25	10.43	10.61	10.78	10.96	11.14
23	9.27	9.45	9.62	9.80	9.96	10.15	10.33	10.51	10.69	10.87	11.05
24	9.17	9.35	9.53	9.71	9.89	10.06	10.25	10.43	10.61	10.79	10.98
25	9.09	9.27	9.45	9.63	9.81	9.98	10.17	10.35	10.54	10.72	10.91
26	9.01	9.19	9.37	9.55	9.74	9.92	10.10	10.29	10.47	10.66	10.85
27	8.94	9.13	9.31	9.49	9.67	9.86	10.05	10.23	10.42	10.61	10.80
28	8.88	9.07	9.25	9.43	9.62	9.81	9.99	10.18	10.37	10.56	10.75
29	8.83	9.01	9.20	9.38	9.57	9.76	9.95	10.14	10.33	10.52	10.71
30	8.78	8.97	9.15	9.34	9.53	9.72	9.91	10.10	10.29	10.48	10.68
35	8.60	8.79	8.98	9.18	9.37	9.57	9.77	9.96	10.16	10.36	10.56
40	8.49	8.69	8.89	9.09	9.29	9.49	9.69	9.89	10.08	10.29	10.49

# Yrs.	12¾%	13%	13¼%	13½%	13¾%	14%	14¼%	14½%	14¾%	15%	15¼%
5	22.63	22.76	22.89	23.01	23.14	23.27	23.40	23.53	22.66	23.79	23.93
10	14.79	14.94	15.08	15.23	15.38	15.53	15.68	15.83	15.99	16.14	16.29
12	13.60	13.75	13.91	14.06	14.22	14.38	14.53	14.69	14.85	15.01	15.18
15	12.49	12.66	12.82	12.99	13.15	13.32	13.49	13.66	13.83	14.00	14.17
16	12.24	12.40	12.57	12.74	12.91	13.08	13.25	13.43	13.60	13.77	13.95
17	12.02	12.19	12.36	12.53	12.71	12.88	13.05	13.23	13.41	13.58	13.76
18	11.84	12.01	12.18	12.36	12.53	12.71	12.89	13.06	13.24	13.42	13.60
19	11.68	11.85	12.03	12.21	12.39	12.56	12.74	12.92	13.10	13.29	13.47
20	11.54	11.72	11.90	12.08	12.26	12.44	12.62	12.80	12.99	13.17	13.36
21	11.43	11.61	11.79	11.97	12.15	12.33	12.52	12.70	12.89	13.08	13.26
22	11.33	11.51	11.69	11.87	12.06	12.24	12.43	12.62	12.81	12.99	13.18
23	11.24	11.42	11.61	11.79	11.98	12.17	12.35	12.54	12.73	12.92	13.12
24	11.16	11.35	11.53	11.72	11.91	12.10	12.29	12.48	12.67	12.86	13.06
25	11.10	11.28	11.47	11.66	11.85	12.04	12.23	12.43	12.62	12.81	13.01
26	11.04	11.23	11.42	11.61	11.80	11.99	12.19	12.38	12.57	12.77	12.97
27	10.99	11.18	11.37	11.56	11.76	11.95	12.14	12.34	12.54	12.73	12.93
28	10.94	11.14	11.33	11.52	11.72	11.91	12.11	12.31	12.50	12.70	12.90
29	10.91	11.10	11.29	11.49	11.68	11.88	12.08	12.28	12.47	12.67	12.87
30	10.87	11.07	11.26	11.46	11.66	11.85	12.05	12.25	12.45	12.65	12.85
35	10.76	10.96	11.16	11.36	11.56	11.76	11.96	12.17	12.37	12.57	12.78
40	10.70	10.90	11.10	11.31	11.51	11.72	11.92	12.13	12.33	12.54	12.74

# Yrs.	15½%	15¾%	16%	16¼%	16½%	16¾%	17%	17½%	18%
5	24.06	24.19	24.32	24.46	24.59	24.72	24.86	25.13	25.40
10	16.45	16.60	16.76	16.91	17.07	17.23	17.38	17.70	18.02
12	15.34	15.50	15.66	15.83	15.99	16.16	16.32	16.66	17.00
15	14.34	14.52	14.69	14.87	15.04	15.22	15.40	15.75	16.11
16	14.12	14.30	14.48	14.65	14.83	15.01	15.19	15.55	15.92
17	13.94	14.12	14.30	14.48	14.66	14.84	15.02	15.39	15.76
18	13.78	13.96	14.15	14.33	14.51	14.70	14.88	15.26	15.63
19	13.65	13.84	14.02	14.21	14.39	14.59	14.77	15.15	15.53
20	13.54	13.75	13.92	14.11	14.29	14.48	14.67	15.05	15.44
21	13.45	13.64	13.83	14.02	14.21	14.40	14.59	14.98	15.37
22	13.37	13.56	13.75	13.95	14.14	14.33	14.53	14.91	15.31
23	13.31	13.50	13.69	13.89	14.08	14.27	14.47	14.86	15.26
24	13.25	13.44	13.64	13.83	14.03	14.23	14.42	14.82	15.21
25	13.20	13.40	13.59	13.79	13.99	14.18	14.38	14.78	15.18
26	13.16	13.36	13.56	13.75	13.95	14.15	14.35	14.75	15.15
27	13.13	13.32	13.52	13.72	13.92	14.12	14.32	14.72	15.13
28	13.10	13.30	13.50	13.70	13.90	14.10	14.30	14.70	15.11
29	13.07	13.27	13.47	13.67	13.87	14.08	14.28	14.68	15.09
30	13.05	13.25	13.45	13.65	13.86	14.06	14.26	14.67	15.08
35	12.98	13.19	13.39	13.59	13.80	14.00	14.21	14.62	15.03
40	12.95	13.16	13.36	13.57	13.77	13.98	14.19	14.60	15.02

BEST COPY

4. Prepare a statement of adjustments for each of the following:

1. a) Closing date is April 15.
   b) Purchase price of property is $31 000.
   c) The buyer made a $1000 deposit at the time the offer to purchase was signed.
   d) The buyer is assuming the existing mortgage at 18%. The unpaid balance on April 15 is $16 000.
   e) Taxes are $1540 per year which were paid in full.
   f) A 3-year premium for fire insurance was paid on October 15 of the previous year. The premium was $380.00.

Particulars	Charged to Buyer	Credited to Buyer

Note:

- Mortgage interest is calculated daily for all problems.
- When calculating taxes or insurance refunds use a fraction of 12 months such as $\frac{6}{12}$ or $\frac{8.5}{12}$ etc.

BEST COPY

2. a) Purchase price of property is $36 800.
   b) Closing date is July 31.
   c) The obligation of paying off an existing mortgage on the property is assumed by the purchaser. The balance owing on the mortgage at the end of the preceding month was $22 750. Equal monthly payments are made at the end of each month, including interest at 19 1/2% per annum.
   d) No taxes have been paid for the current year. The property is assessed at $12 400 and the tax rate is 62 mills.
   e) A fire insurance policy, which has been in effect 6 months as of the closing date, is to be transferred to the purchaser. The premium on the policy was $320 for 1 year and was prepaid.
   f) A deposit of $1500 was made by the purchaser.
   g) What balance is due the seller?

Particulars	Charged to Buyer	Credited to Buyer

3. a) Closing date is November 30.
   b) Purchase price is $86 000.
   c) Deposit on purchase price is $5000.
   d) Taxes for the year have been paid in full. Assessment is $34 000 and the rate is 52 mills.
   e) The purchaser assumes a mortgage of $62 000 at 18%. The last payment was made on October 30.
   f) The house is heated by an oil furnace. The full tank contains 188 L on the closing date. The purchaser agrees to pay for this oil at 31.2¢/L.
   g) A fire insurance policy of $72 000 is transferred to the purchaser. The yearly premium was $490, which was paid 6 months prior to the closing date.
   h) The seller agrees to accept from the purchaser a second mortgage on the property for $8000 at 22 1/2% interest on the closing date.
   i) What is the balance due to the seller?

Particulars	Charged to Buyer	Credited to Buyer

Review Exercises

1. Walter bought a $48 000 home for $35 000 down and gave the seller a $13 000 mortgage at 10%. Walter was to make regular half-yearly payments of $1000 plus interest on the unpaid balance, beginning June 1. Complete an amortization schedule for Walter's first four payments.

2. Earl bought a $48 000 property for $19 000 down and signed a mortgage agreement to pay the remainder of the purchase price by equal quarterly payments on principal of $450 plus interest on the unpaid balance at 11 1/4%.

   a) Complete a schedule showing Earl's payments for the first year.
   b) How much will Earl still owe on his mortgage at the end of 5 years?
   c) How long will it take Earl to pay off the mortgage at the present rate?

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

3. A $45 000 home was purchased on September 1. The buyer made a $20 000 down payment and gave a 20-year mortgage for the balance of the purchase price, which was to be paid in equal monthly payments, beginning October 1. The interest rate was 11% per annum.

   a) Using the amortization table, find the equal monthly payment.
   b) Prepare an amortization schedule for the first four payments.

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		

4. A mortgage of $15 000 is to be paid off with interest over a period of 30 years. The monthly payment is $168.90 including principal and interest. What is the interest rate on the mortgage?

5. Prepare a statement of adjustments using the following information:

   a) Closing date, March 15.
   b) Purchase price, $53 000.
   c) The purchaser assumes the existing mortgage. The unpaid balance on February 28 was $32 850. Equal monthly payments, including principal and interest at 10%, are to be made at the end of each month.
   d) Deposit on purchase price is $1000.
   e) No taxes have been paid. The property was assessed at $15 000, and the tax rate is 68.3 mills.
   f) The $41 000 fire insurance policy is to be transferred to the new owner. The $156.00 premium for the 3-year policy was paid on September 15 of the previous year.

Particulars	Charged to Buyer	Credited to Buyer

6. Prepare a statement of adjustment using the following information:

   a) Closing date, April 30.
   b) Purchase price, $43 600.
   c) Deposit, $950.
   d) The purchaser will assume the existing 10 1/2%, $30 675 mortgage. The last monthly payment was made March 31.
   e) Taxes were based on an assessment of $18 000 and a tax rate of 58.2 mills. Taxes were paid to September 1.
   f) The last premium on the $30 000 fire insurance policy was paid on December 1 of the previous year. The insurance cost was $1.55 per $100 of coverage.
   g) The fuel tank contained 300 L of oil worth 29.7¢/L.

Particulars	Charged to Buyer	Credited to Buyer

C.I. CONSUMER MATHEMATICS - ANSWERS

A. BUDGETING

I. Charles Family

Budget Form - September

Income:		AVERAGE MONTHLY INCOME
Regular Annual Income	$ 23 153.00	
Additional Annual Income	$ 969.48	
Other Income	$	1) $ 2010.21
Total Annual Income	$ 24 122.48	
Expenses - Monthly Fixed Expenses		
Mortgage or Rent	$ 525.00	
Car Payment	$ 213.50	
Telephone	$ 10.40	
Hydro	$ 80.00	
Other Utilities	$	
Car Insurance	$ 20.00	
Life Insurance	$ 20.00	
Home Insurance	$ 15.00	
Property Taxes	$ 60.42	TOTAL MONTHLY
Other:	$	
	$	2) $ 944.32
	$	
Total Fixed Expenses	$ 944.32	
Variable Expenses		
Groceries	$ 425.00	
Clothing	$ 60.42	
Car Maintenance	$ 28.33	
Gasoline	$ 80.00	
Credit Card Debt	$	
Entertainment	$ 20.83	
Vacations	$	
Other: Christmas	$ 19.17	
Newspapers	$ 5.42	TOTAL MONTHLY
	$	
	$	3) $ 639.17
Total Variable Expenses	$ 639.17	
Reserve Fund		
Target Size (2 months' Income)	$ 4020.42	
		4) $ 335.04

Summary		
1) Net Income for Month		#1 $ 2010.21
2) Fixed Expenses	#2 $ 944.32	
3) Variable Expenses	#3 $ 639.17	
4) Reserve Fund Payment	#4 $ 335.04	
Total 2 + 3 + 4		$ 1918.53
5) Amount Available for other Savings or Expenditures (or deficit)		#5 $ 91.68

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT

2. Wood Family

Budget Form - August

Income:		AVERAGE MONTHLY INCOME
Regular Annual Income	$ 40 208.48	
Additional Annual Income	$ 1 292.64	
Other Income	$	1) $ 3 458.43
Total Annual Income	$ 41 501.12	
Expenses - Monthly Fixed Expenses		
Mortgage or Rent	$ 733.15	
Car Payment	$ 237.75	
Telephone	$ 20.20	
Hydro	$ 200.00	
Other Utilities	$	
Car Insurance	$ 25.83	
Life Insurance	$ 30.20	
Home Insurance	$ 21.00	
Property Taxes	$ 163.33	TOTAL MONTHLY
Other:	$	
	$	2) $ 1 431.46
	$	
Total Fixed Expenses	$ 1 431.46	
Variable Expenses		
Groceries	$ 740.00	
Clothing	$ 100.00	
Car Maintenance	$ 38.33	
Gasoline	$ 140.00	
Credit Card Debt	$ 200.00	
Entertainment	$ 160.00	
Vacations	$ 180.00	
Other:	$ 8.50	TOTAL MONTHLY
	$	
	$	
	$	3) $ 1 566.83
Total Variable Expenses	$ 1 566.83	
Reserve Fund		
Target Size (2 months' income)	$ 6 916.86	
		4) $ 576.41

Summary				
1) Net Income for Month			#1	$ 3 458.43
2) Fixed Expenses	#2	$ 1 431.46		
3) Variable Expenses	#3	$ 1 566.83		
4) Reserve Fund Payment	#4	$ 576.41		
Total 2 + 3 + 4				$ 3 574.70
5) Amount Available for other Savings or Expenditures (or deficit)			#5	$ (116.27)

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT
$576.41 - 116.27 = $460.14

3. Elsimatesky Family

Budget Form - May

Income:

Regular Annual Income	$ 31 829.20
Additional Annual Income	$ 646.32
Other Income	$
Total Annual Income	$ 32 475.52

AVERAGE MONTHLY INCOME

1) $ 2 706.29

Expenses - Monthly Fixed Expenses

Mortgage or Rent	$ 725.60
Car Payment	$ 186.40
Telephone	$ 11.30
Hydro	$ 225.00
Other Utilities	$
Car Insurance	$ 28.08
Life Insurance	$ 20.00
Home Insurance	$ 25.83
Property Taxes	$ 152.50
Other: Boat payment	$ 130.00
	$
	$
Total Fixed Expenses	$ 1 504.71

TOTAL MONTHLY

2) $ 1 504.71

Variable Expenses

Groceries	$ 525.00
Clothing	$ 54.17
Car Maintenance	$ 46.67
Gasoline	$ 100.00
Credit Card Debt	$
Entertainment	$ 30.00
Vacations	$ 78.33
Other: Christmas savings	$ 40.00
Baby-sitter	$ 196.00
Newspapers	$ 7.00
	$
Total Variable Expenses	$ 1 077.17

TOTAL MONTHLY

3) $ 1 077.17

Reserve Fund

Target Size (2 months' Income)	$ 5 412.58

4) $ 451.05

Summary

1) Net Income for Month		#1 $ 2 706.29
2) Fixed Expenses	#2 $ 1 504.71	
3) Variable Expenses	#3 $ 1 077.17	
4) Reserve Fund Payment	#4 $ 451.05	
Total 2 + 3 + 4		$ 3 032.93
5) Amount Available for other Savings or Expenditures (or deficit)		#5 $ (326.64)

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT

$451.05 - 326.64 = $124.41

4. Hill Family

Budget Form - March

Income:		AVERAGE MONTHLY INCOME
Regular Annual Income	$ 35 022.00	
Additional Annual Income	$ 646.32	
Other Income	$	1) $ 2 972.36
Total Annual Income	$ 35 668.32	
Expenses - Monthly Fixed Expenses		
Mortgage or Rent	$ 715.40	
Car Payment	$ 206.10	
Telephone	$ 12.50	
Hydro	$ 305.20	
Other Utilities	$	
Car Insurance	$ 25.25	
Life Insurance	$	
Home Insurance	$ 12.45	
Property Taxes	$ 100.00	TOTAL MONTHLY
Other:	$ 62.80	
	$	2) $ 1 439.70
	$	
Total Fixed Expenses	$ 1 439.70	
Variable Expenses		
Groceries	$ 560.00	
Clothing	$ 69.17	
Car Maintenance	$ 35.00	
Gasoline	$ 92.00	
Credit Card Debt	$	
Entertainment	$ 216.67	
Vacations	$ 75.00	
Other:	$ 40.00	
	$ 8.50	TOTAL MONTHLY
	$ 30.33	
	$	3) $ 1 126.67
Total Variable Expenses	$ 1 126.67	
Reserve Fund		
Target Size (2 months' Income)	$ 5 944.72	
		4) $ 495.39

Summary		
1) Net Income for Month		#1 $ 2 972.36
2) Fixed Expenses	#2 $ 1 439.70	
3) Variable Expenses	#3 $ 1 126.67	
4) Reserve Fund Payment	#4 $ 495.39	
Total 2 + 3 + 4		$ 3 061.76
5) Amount Available for other Savings or Expenditures (or deficit)		#5 $ (89.40)

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT
495.39 - 89.40 = $405.99

5. Murray Family

Budget Form - April

Income:		AVERAGE MONTHLY INCOME
Regular Annual Income	$ 25 853.08	
Additional Annual Income	$ 323.16	
Other Income	$	1) $ 2 181.35
Total Annual Income	$ 26 176.24	

Expenses - Monthly Fixed Expenses		
Mortgage or Rent	$ 425.00	
Car Payment	$	
Telephone	$ 10.50	
Hydro	$ 41.75	
Other Utilities	$ 61.67	
Car Insurance	$ 24.00	
Life Insurance	$	
Home Insurance	$ 20.17	
Property Taxes	$ 60.83	TOTAL MONTHLY
Other: Bank Loan	$ 165.00	
Loan	$ 180.00	2) $ 988.92
	$	
Total Fixed Expenses	$ 988.92	

Variable Expenses		
Groceries	$ 420.00	
Clothing	$ 66.25	
Car Maintenance	$ 21.25	
Gasoline	$ 105.00	
Credit Card Debt	$	
Entertainment	$ 27.50	
Vacations	$ 70.83	
Other:	$ 13.75	
	$ 10.42	TOTAL MONTHLY
	$	
	$	3) $ 735.00
Total Variable Expenses	$ 735.00	

Reserve Fund		
Target Size (2 months' Income)	$ 4 362.70	
		4) $ 363.56

Summary		
1) Net Income for Month		#1 $ 2 181.35
2) Fixed Expenses	#2 $ 988.92	
3) Variable Expenses	#3 $ 735.00	
4) Reserve Fund Payment	#4 $ 363.56	
Total 2 + 3 + 4		$ 2 087.48
5) Amount Available for other Savings or Expenditures (or deficit)		#5 $ 93.87

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT

6. Sampson Family

Budget Form - November

Income:		AVERAGE MONTHLY INCOME
Regular Annual Income	$ 36 984.00	
Additional Annual Income	$ -	
Other Income	$ -	1) $ 3 082.00
Total Annual Income	$ 36 984.00	
Expenses - Monthly Fixed Expenses		
Mortgage or Rent	$ 715.00	
Car Payment	$ 212.00	
Telephone	$ 15.20	
Hydro	$ 43.00	
Other Utilities	$ 49.00	
Car Insurance	$ 32.33	
Life Insurance	$ 30.00	
Home Insurance	$ 25.00	
Property Taxes	$ 86.00	TOTAL MONTHLY
Other:	$ 100.00	
	$	2) $ 1 307.53
	$	
Total Fixed Expenses	$ 1 307.53	
Variable Expenses		
Groceries	$ 420.00	
Clothing	$ 80.00	
Car Maintenance	$ 50.00	
Gasoline	$ 150.00	
Credit Card Debt	$	
Entertainment	$ 200.00	
Vacations	$ 150.00	
Other:	$ 12.50	
	$	TOTAL MONTHLY
	$	
	$	3) $ 1 062.50
Total Variable Expenses	$ 1 062.50	
Reserve Fund		
Target Size (2 months' Income)	$ 6 164.00	
		4) $ 513.67

Summary		
1) Net Income for Month		#1 $ 3 082.00
2) Fixed Expenses	#2 $ 1 307.53	
3) Variable Expenses	#3 $ 1 062.50	
4) Reserve Fund Payment	#4 $ 513.67	
Total 2 + 3 + 4		$ 2 883.70
5) Amount Available for other Savings or Expenditures (or deficit)		#5 $ 198.30

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT

7. McConnell Family

Budget Form - October

Income:		AVERAGE MONTHLY INCOME
Regular Annual Income	$ 36 088.00	
Additional Annual Income	$ 969.48	
Other Income	$	1) $ 3 088.12
Total Annual Income	$ 37 057.48	

Expenses - Monthly Fixed Expenses		
Mortgage or Rent	$ 612.25	
Car Payment	$ 310.00	
Telephone	$ 13.80	
Hydro	$ 90.00	
Other Utilities	$	
Car Insurance	$ 29.67	
Life Insurance	$ 40.00	
Home Insurance	$ 22.00	
Property Taxes	$ 89.83	TOTAL MONTHLY
Other:	$ 150.00	
	$	2) $ 1 357.55
	$	
Total Fixed Expenses	$ 1 357.55	

Variable Expenses		
Groceries	$ 475.00	
Clothing	$ 208.33	
Car Maintenance	$ 41.67	
Gasoline	$ 120.00	
Credit Card Debt	$ 40.00	
Entertainment	$ 150.00	
Vacations	$ 200.00	
Other: Newspapers	$ 13.33	
Baby-sitter	$ 30.00	TOTAL MONTHLY
	$	
	$	3) $ 1 2878.33
Total Variable Expenses	$ 1 278.33	

Reserve Fund		
Target Size (2 months' Income)	$ 6 176.24	
		4) $ 514.69

Summary		
1) Net Income for Month		#1 $ 3 088.12
2) Fixed Expenses	#2 $ 1 357.55	
3) Variable Expenses	#3 $ 1 278.33	
4) Reserve Fund Payment	#4 $ 514.69	
Total 2 + 3 + 4		$ 3 150.57
5) Amount Available for other Savings or Expenditures (or deficit)		#5 $ (62.45)

Note: If the person is in as Deficit Position, the Reserve Fund Payment must be reduced by:

RESERVE FUND PAYMENT - DEFICIT = NEW RESERVE PAYMENT
$514.69 - 62.45 = $452.24

B. TAXATION

Income Tax

Answers are not provided due to variation of rates from year to year.

1. Real Property Tax

1. a) 3.3¢ b) 3.6¢ c) 3.7¢
2. 2.4¢
3. a) 8.8¢ b) 9.1¢ c) 10.6%
4. 1.9¢
5. a) 82 mills b) 87 mills c) 101 mills
6. 42 mills
7. 91 mills

2.

1. a) $288 b) $1120 c) $3300 d) $9000 e) $2025
2. $1000
3. 7¢ x 15 000 = $980.00 general tax
   93.50 local improvements
   $1073.50 total
4. a) $2300 b) $20 400 c) $960 d) $300
5. 40% x $52 000 = $20 800 assessed value
   5% x $20 800 = $ 1 040 tax bill
6. 30% x $220 000 = $66 000 assessed value
   $66 000 x 5% = $3300 general tax
   $3300 + 150 (1500 ÷ 10) + 86 (860 ÷ 10) = $3536
7. a) $992 b) $3712 c) $190 d) $1650
8.

Cottage	$11 200	$582.40	$582.40
Bungalow	21 840	1201.20	1336.40
Duplex	42 240	2534 40	2703.25
Factory	128 000	7936.00	8281.50

9. $38 000 x 40% = $15 200 assessed value
   $15 200 x 61/100 = $927.20 general tax, + 128.50 = $1055.70 total tax
10. Year 1 - $1020
    Year 2 - $1225 - The amount of general tax increase was 1225 - 1020 = $205

BEST COPY

Hidden Taxes

1. 1. a) $310
b) $344
c) $830
d) $1200
e) $125

2. $81.25

2. 1. Cost $250 x 10 = $2500
Custom tariff: $2500 x 15% = $375

2. Total cost: 100 x 5 = $500
Custom tariff: $500 x 15% = $75
Duty-Paid Value: $500 + $75 = $575
Federal Sales Tax $575 x 10% = $57.50
Total Cost to Import $575 + 57.50 = $632.50

3. Tariff from Britain: $17 x 10% = $1.70
Duty-Paid Value: $17 + 1.70 = $18.70
Federal Sales Tax: $18.70 x 10% = $1.87
Total Cost to Import: $18.70 + 1.87 = $20.57

Tariff from U.S. $15.50 x 15% = $2.33
Duty-Paid Value: $15.50 + 2.33 = $17.83
Federal Sales Tax: $17.83 x 10% = $1.78
Total Cost to Import $17.83 + 1.78 = $19.61

Therefore U.S. drill is cheaper by:

$20.57 - 19.61 = $0.96

4. Total Cost: 1000 x $3 = $3000
Custom Tariff: $3000 x 15% = $450
Duty-Paid Value: $3000 + $450 = $3450
Federal Sales Tax: $3450 x 10% = $345
Total Cost to Import: $3450 + $345 = $3795

3. 1. Cost of Cards: $100 x $0.50 = $50.00
Federal Sales Tax: $50.00 x 10% = $5.00
Excise Tax: 100 x $0.20 = $20.00
Total Cost: $50.00 + $5.00 + 20.00 = $75.00

2. Cost of Tobacco: 1500 x $2.50 = $3750.00
Custom Tariff: 1500 x $0.40 = $600.00
Duty-Paid Value: $3750 + $600 = $4350.00
Federal Sales Tax: $4350 x 10% = $435.00
Excise Tax: 1500 x $0.90 = $1350.00
Total Imported Cost: $4350 + $435.00 + $1350 = $6135.00

3. Cost of watches: $80 x 25 = $2000
Custom Tariff: $2000 x 20% = $400
Duty-Paid Value: $2000 + $400 = $2400
Federal Sales Tax: $2400 x 10% = $240

The duty-paid value of each watch is $2400 ÷ 25 = $96; only the amount above $50.00 is subject to excise tax. Therefore, the amount subject to excise tax is $96 - 50 = $46 x 25 watches = $1150. Excise tax: $1150 x 10% = $115
Total imported cost: $2400 + $240 + $115 = $2755.00

4. Custom tariff: $1500 x 45% = $675.00
Duty-paid value: $1500 + $675 = $2175.00
Federal Sales Tax: $2175 x 10% = $217.50
Excise Tax: $2175 x 10% = $217.50
Total imported cost: $2175 + 217.50 + $217.50 = $2610.00

C. INSURANCE

Life Insurance

4.		a)	$53.70
		b)	$1255.00
		c)	$649.00
		d)	$1606.50
		e)	$605.00
		f)	$6294.60
		g)	$963.00
		h)	$3070.50
		i)	$980.50
		j)	$3049.20
	2.	a)	$46.06
		b)	$166.41
		c)	$14.02
		d)	$2560.61
		e)	$168.52
		f)	$95.46
	3.		$3.20
	4.		$45 000
	5.		$36 000; $100 000
	6.		$25 000
	7.		$8.70
	8.		$152.65

Property Insurance

7.	1.	a)	$78		
		b)	$119		
		c)	$306		
		d)	$169		
		e)	$387		
		f)	$1020		
		g)	$44		
		h)	$537		
	2.	a)	$78.00 ;	$139.00 ;	$61.00
		b)	$249.00 ;	$558.00 ;	$309.00
		c)	$170.00 ;	$327.00 ;	$157.00
		d)	$134.00 ;	$243.00 ;	$109.00
	3.		$1.00 more for Danny.		

8.	1.	a)	$283.00
		b)	$856.00
		c)	$483.00
		d)	$143.00
	2.	a)	$85.00
		b)	$294.00
		c)	$164.00
		d)	$117.00
9.	1.	a)	$65.00
		b)	$204.00
		c)	$61.00
		d)	$197.00
		e)	$78.00
	2.		$250.00
10.	1.	a)	$45 000, since 80% of 75 000 = $60 000
		b)	$5000, since 80% of 35 000 = $28 000
		c)	(25 000/0.8 x 38 000) x 19 500 = $16 036.18
		d)	$40 000
		e)	(20 000/0.8 x 34 000) x 12 500 = $9191.18
		f)	(38 000/0.8 x 59 000) x 30 000 = $24 152.54
		g)	(25 000/0.8 x 46 000) x 22 000 = $14 945.65
		h)	(16 000/0.8 x 26 000) x 5000 = $3846.15
	2.		$22 000

Automobile Insurance

12.	1.	$186.00	6.	$370.00
	2.	$242.00	7.	$278.00
	3.	$501.00	8.	$204.00
	4.	$457.00	9.	$215.00
	5.	$161.00	10.	$154.00

13.	1.	$78.00
	2.	$89.00
	3.	$71.00
	4.	$96.00
		The practice is only legal for under 1000 miles of travel per year.

Insurance Review Questions

1.		$484.50				
2.	a)	$$675.75	b)	$689.00	c)	$691.65
3.	a)	$175.93	b)	$1935.23		
4.		$69.62				
5.		$6.40				
6.		$20 800				
7.		$99				
8.		$1060				
9.		$25 000				
10.		$410				
11.		$86				
12.		$227.24				
13.		$140 000				

D. MORTGAGES

1\.

1. }
2. } Answers will vary from community to community.
3. }

2\.

1. a) A mortgage is a loan secured by property.
b) Casey & Evelyn
c) Bank of Montreal
d) Mr. Charles
e) $20 800 ($85 500 - 49 700 = 35 800 - 15 000 = $20 800)
f) 12 1/2%
g) 21%
h) A second mortgagee takes a greater risk than the first mortgagee because the first mortgagee has first claim on the property if the mortgagor fails to keep up his/her financial commitment.

3.

1. Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
Aug 1 - 1				$6000	$26,000
July 31 - 2	750.00	$1080.00	$1830	5250	26750
July 31 - 3	750.00	945.00	1695	4500	27500
July 31 - 4	750.00	810.00	1560	3750	28250
July 31 - 5	750.00	675.00	1425	3000	29000
July 31 - 6	750.00	540.00	1290	2250	29750
July 31 - 7	750.00	405.00	1155	1500	30500
July 31 - 8	750.00	270.00	1020	750	31250
July 31 - 9	720.00	135.00	885	0	32000

2. Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
Mar. 1				$26 000	
Mar. 31	$250	$427.92	$677.92	25750	
Apr. 30	250	423.80	673.80	25500	
May 31	250	419.69	669.69	25250	
June 30	250	415.57	665.58	25000	
July 31	250	411.46	661.46	24750	
Aug. 31	250	407.34	657.34	24500	

a) $2505.78

b) $1500.00

c) 250 per month x 12 = $3000 per year
26 000 ÷ 3000 = 8.7 or 8 years 9 months

3. a)

Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
				\$50 000.^{00}	
Year 1 1st pmt	\$ 500	\$2812.50	\$3312.50	49500^{00}	
2nd pmt	500	2784.38	3284.38	49000^{00}	
3rd pmt	500	2756.25	3256.25	48500^{00}	
4th pmt	500	2728.13	3228.13	48000^{00}	
Year 2 1st pmt	500	2700.00	3200.00	47500^{00}	
2nd pmt	500	2671.88	3171.88	47000^{00}	
3rd pmt	500	2643.75	3143.75	46500^{00}	
4th pmt	500	2615.63	3115.63	46000^{00}	

b) 5000 - (500 x 4)= 2000 x 10 years) 20 000 = \$30 000

c) 50 000 ÷ 2000 payments per year = 25 years

4. a) Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
				$25000	$20000
Sep.15	$320	$390.63	$710.63	24680	20320
Oct 15	320	385.63	705.63	24360	20640
Nov 15	320	380.63	700.63	24040	20960
Dec.15	320	375.63	695.63	23720	21280
Jan 15	320	370.63	690.63	23400	21600
Feb.15	320	365.63	685.63	23080	21920

b) $2268.78 interest

c) Principal = 6 x $320 = $1920

d) 25 000/320 x 12 = 6.5 = 6 years 6 months

e) Owner's Equity = $320 x 12 = $3840 per year
$3840 x 5 years = $19 200
$25 000 + $19 200 = $39 200

3b-i. I. Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
				$\$38\,000^{00}$	$\$27\,000^{00}$
Jan. 15	$\$59.^{58}$	(38000x.1975x$\frac{1}{12}$) \$625.42	\$685	$37\,940^{42}$	27059^{58}
Feb. 15	$60.^{56}$	624.44	685	37879^{86}	27120^{14}
Mar. 15	$61.^{56}$	623.44	685	37818^{30}	27181^{70}
Apr. 15	$62.^{57}$	622.43	685	37755^{73}	27244^{27}
May 15	$63.^{60}$	621.40	685	37692^{13}	27307^{87}
June 15	$64.^{65}$	620.35	685	37627^{48}	27372^{52}

a) Interest \$3737.48

b) Principal \$372.52

3b-ii.

1\.
a) $133.50
b) $661.70
c) $921.71
d) $236.50
e) $1065.78
f) $1309.84
g) $1129.63
h) $741.60

2. Mortgage required $72 000 - 10 000 = $62 000
Monthly payment: $\frac{\$62\ 000}{1000} \times 11.66 = \$722.92$

3\.
a) Monthly payment: $\frac{\$50\ 000}{1000} \times 10.91 = \$545.50$
b) Monthly payment: $\frac{\$50\ 000}{1000} \times 11.37 = \$568.50$
c) Total paid over 20 years: $568.50 × 12 × 20 = $136 440.00
Total paid over 25 years: $545.50 × 12 × 25 = $163 650.00
Difference is $163 650 - 136 440 = $27 210.

4. Payment on 1st mortgage: $\frac{67\ 000}{1000} \times 9.45 = \$633.15$

Second mortgage amount: 90 000 - (67 000 + 10 000) = $13 000
Payment on 2nd mortgage: $\frac{13\ 000}{1000} \times 12.04 = \$156.52$
Total monthly payment: $633.15 + 156.52 = $789.67

5. Payment at higher rate: $\frac{\$50\ 000}{1000} \times 15.18 = \$759.00$

   Payment at lower rate: $\frac{\$50\ 000}{1000} \times 11.47 = \$573.50$

   Extra amount: $\$759.00 - 573.50 = \$185.50$

6. a) Equal payment: $\frac{42\ 000}{1000} \times 15.83 = \$664.86$

b) **Schedule of Mortgage Payments**

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
				$42 000.00	$30 000.00
Aug.1	$157.36	$507.50	$664.86	$41 842.64	$30 157.36
Sept.1	$159.26	$505.60	$664.86	$41 683.38	$30 316.62
Oct.1	$161.19	$503.67	$664.86	$41 522.19	$30 477.81
Nov.1	$163.13	$501.73	$664.86	$41 359.06	$30 640.94
Dec.1	$165.10	$499.76	$664.86	$41 193.96	$30 806.04
Jan.1	$167.10	$497.76	$664.86	$41 026.86	$30 973.14
Feb.1	$169.12	$495.74	$664.86	$40 857.74	$31 142.26

7. a) Monthly payment: $\frac{\$15\ 000}{1000} \times 14.34 = \$215.10$

   b) Interest on first payment: $\$15\ 000 \times 15\tfrac{1}{2}\% \times \frac{1}{12} = \$193.75$

8. a) Mortgaged amount $42 000 - $25 000 = $17 000

   Monthly payment: $\frac{17\ 000}{1000} \times 15.23 = \$258.91$

   b) Interest on first payment: $\$17\ 000 \times 13.5\% \times \frac{1}{12} = \$191.25$

   c) Total paid in 10 years: $258.91 x 12 x 10 = $31 069.20

   d) Total interest paid: $31 069.20 - $17 000 = $14 069.20

9. a) Mortgaged amount: $42 000 - 12 000 = $30 000

   Monthly payment: $\frac{\$30\ 000}{1000} \times 10.54 = \$316.20$

   b) Total paid: $316.20 x 12 x 25 = $94 860

10. a) Monthly payment on first mortgage is:

   $$\frac{55\ 000}{1000} \times 8.78 = \$482.90$$

   b) Second mortgage $83 000 - ($15 000 + 55 000) = $13 000

   Monthly payment for second mortgage:

   $$\frac{13\ 000}{1000} \times 17.23 = \$223.99$$

   c) Total paid on 1st mortgage: $482.99 x 12 x 30 = $173 844.00

   Total paid on 2nd mortgage: $223.99 x 12 x 10 = $ 26 878.80

   Total paid: $15 000 + 173 844.00 + 26 878.80 = $215 722.80

4. 1.

Mr. Mortgage Buyer
Statement of Adjustments
19 -- 04 15

Particulars	Charged to Buyer	Credited to Buyer
Purchase Price	$31 000.00	
Deposit		$1000.00
Mortgage		16 000.00
Mortgage Interest (March 31 - April 15)		118.36
Taxes - April 15 to December 31	1 090.83	
Insurance for 30 months	316.67	
Balance due seller		15 289.14
	$32 407.50	$32 407.50

Explanation:

a) purchase price of $31 000 charged to buyer
b) buyer is credited with the $1000 deposit
c) the buyer is assuming the existing mortgage at 18%. The unpaid balance on April 15 is $16 000. The seller pays the interest on the mortgage from the time of the last monthly payment to the closing date because he owned the house during this period. Interest from March 31 to April 15:

$$16\ 000 \times 0.18 \times 15/365 = \$118.36$$

Interest is credited to the buyer. The unpaid balance of the mortgage is credited to the buyer since he will pay it in the future.

d) taxes of $1540 have been paid in full. The new owner pays for the taxes from April 15 to December 31 or 8.5 months.
Taxes for 8.5 months - $1540 x 8.5/12 = $1090.83 (charge to buyer)

e) the three-year premium was paid on October 15 of the previous year. Since the policy was in effect for 6 months before the closing date, the buyer should pay for 30 months' insurance.
Cost of 30 months' insurance = 380 x 30/36 = $316.67 (charge to buyer)

f) balance due seller is found by subtracting the total credited to buyer from the total charged to buyer

2.

Mr. Mortgage Buyer
Statement of Adjustments
19 -- 07 31

Particulars	Charged to Buyer	Credited to Buyer
Purchase price	$36 800.00	
Mortgage		$22 750.00
Mortgage interest (July 1 to July 31)		376.78
Taxes		448.47
Insurance policy	160.00	
Deposit		1 500.00
Balance due seller		11 834.75
	$36 960.00	$36 960.00

Explanation:

a) purchase price of $36 800 is charged to buyer

b) buyer is assuming the existing mortgage and this amount is credited to him

c) seller must pay the interest on the mortgage from June 30 to July 31 which is 31 days:

d) i.e. 22 750 × 19 1/2% × 31/365 = $376.78

This amount is credited to the buyer since he will pay for it in the future.

the taxes for the year are:

$12 400 × 62/1000 = $768.80

the seller is responsible for:

$768.80 × 7/12 = $448.47

Therefore, credit the buyer with this amount.

e) buyer is charged with one-half the cost of the insurance policy or:

1/2 × $320 = $160.00

f) buyer is credited with a $1500 deposit

g) balance due seller is found by subtracting the total credited to the buyer from the total charged to buyer

e) the seller must pay the interest on the mortgage from October 30 to November 30 which is 30 days:

i.e. $62 000 × 18% × 30/365 = $917.26

This amount is credited to the buyer since he will pay for it in the future.

f) buyer is charged for the remaining oil in the tank:

188 L at $.312 = $58.66

g) buyer is charged for one-half the insurance policy:

$490 × 1/2 = $245

h) buyer is credited with the amount of the second mortgage

i) balance due seller is found by subtracting the total credited to the buyer from the total charged to buyer

3.

Mr. Mortgage Buyer
Statement of Adjustments
19 -- 11 30

Particulars	Charged to Buyer	Credited to Buyer
Purchase price	$86 000.00	
Deposit		$5 000.00
Taxes	147.33	
Mortgage		62 000.00
Mortgage interest		917.26
Oil	58.66	
Insurance	245.00	
Second Mortgage		8 000.00
Balance due seller		10 533.68
	$86 450.94	$86 450.94

Explanation:

a) purchase price of $86 000 is charged to buyer
b) buyer is credited with a $5000 deposit
c) since the year is 11 months old and the taxes have already been paid, the buyer is charged for one month's taxes or:

$$\$34\ 000 \times \frac{52}{1000} \times \frac{1}{12} = \$147.33$$

d) buyer is assuming the existing mortgage and this amount is credited to him

e) seller must pay the interest on the mortgage from October 30 to November 30 which is 30 days:

$$\text{i.e., } \$62\ 000 \times 18\% \times \frac{30}{365} = \$917.26$$

This amount is credited to the buyer since he will pay for it in the future.

f) buyer is charged for the remaining oil in the tank:

188 L at $0.312 = $58.66

g) buyer is charged for one-half the insurance policy:

$$\$490 \times \frac{1}{2} = \$245$$

h) buyer is credited with the amount of the second mortgage

i) balance due seller is found by subtracting the total credited to the buyer from the total charged to buyer

Review Exercises

1. Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
				$13 000	$35 000
June 1	$1000	$650	$1650	12000	36000
Dec 1	1000	600	1600	11000	37000
June 1	1000	550	1550	10000	38000
Dec. 1	1000	500	1500	9000	39000

2 a) Schedule of Mortgage Payments

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
				$29 000	$19 000
1st quarter	$450	$815.63	$1265.63	28550	19450
2nd quarter	450	802.97	1252.97	28100	19900
3rd quarter	450	790.31	1240.31	27650	20350
4th quarter	450	777.66	1227.66	27200	20800

b) Amount = $29 000 - ($450 x 5 x 4) = $29 000 - 9000 = $20 000

c) Time = $29 000/450 x 4 = 16.11 years = 16 years, 3 months

3. a) Monthly payment, using the amortization schedule, is:

$$\frac{\$25\ 000}{1000} \times 10.33 = \$258.25$$

b) **Schedule of Mortgage Payments**

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
Sept.1				$25 000.10	$20 000.00
Oct.1	$29.08	$229.17	$258.25	24 970.92	20 029.08
Nov.1	29.35	228.90	258.25	24 941.57	20 058.43
Dec.1	29.62	228.63	258.25	24 911.95	20 088.05
Jan.1	29.89	228.36	258.25	24 882.06	20 117.94

4. $168.90 ÷ 15 = $11.26. This payment for 30 years is found in the 13 1/4% column.

5.

Mr. Mortgage Buyer
Statement of Adjustments
19 -- 03 15

Particulars	Charged to Buyer	Credited to Buyer
Purchase price	$53 000.00	
Mortgage		$32 850.00
Mortgage interest		135.00
Deposit on purchase		1 000.00
Taxes		213.44
Fire insurance	130.00	
Balance due seller		18 931.56
	$53 130.00	$53 130.00

Explanation:

Mortgage Interest: $\$32\ 850 \times 10\% \times 15/365 = \$135$

Taxes: $\$15\ 000 \times \frac{68.3}{1000} \times \frac{2.5 \text{ months}}{12} = \$213.44$

Insurance: $\$156 \times \frac{30 \text{ months left}}{36 \text{ original months}} = \$130$

6.

Mr. Mortgage Buyer
Statement of Adjustments
19 -- 05 01

Particulars	Charged to Buyer	Credited to Buyer
Purchase price	$43 600.00	
Deposit		$950.00
Mortgage		30 675.00
Interest on mortgage		264.73
Taxes	349.20	
Insurance	271.25	
Oil	89.10	
Balance due seller		12 419.82
	$44 309.55	$44 309.55

Explanation:

d) Interest: $\$30\ 675 \times 10.5\% \times 30/365 = \$264.73$

e) Taxes: $\$18\ 000 \times \frac{58.2}{1000} \times \frac{4}{12}$ months left = $349.20

f) Insurance: $\frac{\$30\ 000}{100} \times \$1.55 \times \frac{7}{12}$ months left = $271.25

g) Oil: 300 L × .297 = $89.10

C.II. ALGEBRA (3 MODULES)

A. ALGEBRAIC OPERATIONS

1. Write the value of each expression:

a) 4^2
b) 5^3
c) 2^6
d) 1^7
e) 3^1
f) $(-2)^4$
g) $(-3)^3$
h) $(-4)^2$

2. Simplify and write each answer in exponential form:

a) $3^3 \cdot 3^2$
b) $4^5 \cdot 4^6$
c) $2^7 \cdot 2^6$
d) $7^5 \cdot 7^8$
e) $5^6 \cdot 5^3 \cdot 5^2$
f) $2^7 \cdot 2^2 \cdot 2^3$
g) $3^4 \cdot 3^5 \cdot 3^3$
h) $8^2 \cdot 8^3 \cdot 8^3$
i) $x^3 \cdot x^5$
j) $m^4 \cdot m^7$
k) $t^3 \cdot t^2 \cdot t^4$
l) $b^6 \cdot b^3 \cdot b^9$

3. Simplify (evaluate each answer, where possible):

a) $\dfrac{4^4}{6^2}$
b) $\dfrac{10^{22}}{10^{20}}$
c) $\dfrac{11^3}{11^3}$
d) $\dfrac{7^7}{7^4}$
e) $\dfrac{2^{15}}{2^{10}}$
f) $\dfrac{3^3 \cdot 3^4}{3^5}$
g) $\dfrac{5^6 \cdot 5^3}{5^8}$
h) $\dfrac{3^2 \cdot 3^3 \cdot 3^6}{3^4 \cdot 3^5}$
i) $\dfrac{x^9}{x^5}$
j) $\dfrac{a^{16}}{a^9}$
k) $\dfrac{n^3 \cdot n^5}{n^4}$
l) $\dfrac{w^9 \cdot w^8}{w^4 \cdot w^3}$

4. Write the value of each:

a) 2^{-3}
b) 3^{-2}
c) $4^{-3} \cdot 4^5$
d) $2^6 \cdot 2^{-8}$
e) $4^6 \cdot 4^{-4} \cdot 4^1$
f) $2^8 \cdot 2^{-5} \cdot 2^{-2}$
g) $\dfrac{3^6}{3^{-2}}$
h) $\dfrac{2^{-4}}{2^{-5}}$

5. Write the value of each:

a) 2^{-3}
b) 3^{-2}
c) 4^{-3}
d) 8^{-2}
e) $4^6 \cdot 4^{-4} \cdot 4^1$
f) $2^8 \cdot 2^{-5} \cdot 2^{-2}$
g) $\dfrac{3^6}{3^{-2}}$
h) $\dfrac{2^{-4}}{2^{-5}}$
i) $\dfrac{3^{-7}}{3^{-6}}$
j) $\dfrac{4^5}{4^7}$
k) $\dfrac{2^6 \cdot 2^{-8}}{2^3}$
l) $\dfrac{10^2 \cdot 10^3}{10^5 \cdot 10^4}$
m) $\dfrac{9^3 \cdot 9^{-5}}{9^{-6}}$
n) $\dfrac{4^{-2} \cdot 4^3 \cdot 4^{-5}}{4^6 \cdot 4^{-4}}$
o) $\dfrac{(2 \cdot 3)^{-5}}{(3 \cdot 2)^{-6}}$
p) $\dfrac{3^{-5} \cdot 3^{-6}}{3^{-7} \cdot 3^{-3}}$

2\.

1. Simplify each:

- a) $6a + 7a$
- b) $8x + 5x + 3x$
- c) $9m - 5m + 3m$
- d) $6t - 8t - 5t$
- e) $(5x + 6) + (2x - 3)$
- f) $(23 - 17x) + (13 - 9x)$
- g) $(6a^2 + 3a) - (7 + 5a^2) - (8a - 6)$
- h) $(7x - 9) - (5x + 3)$
- i) $(19 + 7x) - (18 - 8x)$
- j) $(5x + 8) - (-3x - 7)$
- k) $(8x + 3) + (7x - 9) + (-6x - 7)$
- l) $(4x - 6) - (-3x + 7) - (5x - 8)$
- m) $(3x + 2) - (3 - 4x) + 2x$
- n) $(3a^2 - a) + (4a - 5) + (2a - 2a^2)$

2. Simplify each:

- a) $2(7x)$
- b) $3\ (4x^3)$
- c) $4(-5a^4)$
- d) $(-6)(-8b^5)$
- e) $(-3)(7m^4)$
- f) $(2x)(3x^4)$
- g) $(-5a^3)(6a^5)$
- h) $(-7m^4)(-8m^8)$
- i) $4(3x + 5)$
- j) $6(5x - 7)$
- k) $-7(3m^2 + 4m)$
- l) $6t(4t^3 + 2t^2)$
- m) $(x + 3)(x + 5)$
- n) $(a - 5)(a + 6)$
- o) $(t + 7)(t + 7)$
- p) $(3b + 2)(2b - 4)$
- q) $(2m - 5)(5m + 4)$
- r) $(3x - 5)(3x + 5)$

3. Simplify each:

- a) $5(a - 2) + 3(2a + 4)$
- b) $3(2b + 6) - 4(3b - 8)$
- c) $5(3m + 7) + 6(-2m - 5)$
- d) $4(-5m - 9) - 6(4m - 8)$
- e) $3t(2t + 1) + 2t(3 - 4t)$
- f) $\dfrac{35x^5}{7x^2}$
- g) $\dfrac{50m^{11}}{25m^8}$
- h) $\dfrac{8z^{15}}{4z^9}$
- i) $\dfrac{32m^4 + 8m^2}{4m}$
- j) $\dfrac{26w^5 + 39w^4}{13w^2}$
- k) $\dfrac{27m^8 - 42m^5 + 69m^2}{3m^2}$

4. Solve each problem:

   a) What must be added to $5x + 3$ to produce zero?
   b) What is the perimeter of a square whose side is $3x^2 = 5x + 2$?
   c) What is the perimeter of an equilateral triangle if a side is $7a - 2$?
   d) Find the perimeter of a triangle whose sides are $(3m - 2)$, $(4m + 6)$ and $8m$.
   e) What must be added to $a^2 - 8$ to produce $a^2 + 8$?
   f) Subtract $5x - 3$ from the sum of $8x + 5$ and $7 - 3x$.
   g) From $(10x^2 - 3)$ subtract the sum of $(3x^2 + 4)$ and $(x^2 + 3)$.
   h) The perimeter of a triangle is $8x + 5$. If two of the sides are $3x - 6$ and $4x + 8$, find the third side.
   i) Find the area of a rectangle if the length is $a + 5$ and the width is $a - 7$.
   j) The length of a rectangle is designated by $3x + 6$, the width is designated by $5x - 2$. Write an expression for its perimeter.
   k) A triangle has its base designated by $6x + 2$ and its altitude designated by $3x - 5$. Write an expression for its area.

3. 1. Write each number in scientific notation:

   a) 36 000
   b) 7300
   c) 82 000 000
   d) 1 250 000 000
   e) 83 million
   f) 23 billion
   g) one hundred billion billion
   h) the product of (one million)(one million)
   i) 30^4
   j) $20 \times 10^3 \times 10^4 \times 10^6$

4. 1. Write each number in scientific notation:

a) 0.0034

b) 0.000 56

c) 0.000 000 08

d) 0.0094

e) 0.000 000 705

f) 0.958

g) 0.000 006 753

h) thirteen ten-thousandths

i) 40^{-2}

j) $(2.3 \times 10^{-6}) \cdot (3.2 \times 10^{-8})$

5. 1. Write the following in expanded notation:

a) 3.46×10^{7}

b) 1.15×10^{-3}

c) 8.6×10^{4}

d) 30.4×10^{-6}

e) 8.88×10^{-4}

f) 1.009×10^{8}

g) 4.5×10^{5}

h) 3.3×10^{-8}

i) 1.00×10^{6}

j) product of $(3.4 \times 10^{-8})(2.3 \times 10^{14})$

2. For extremely large distances, astronomers use a unit called the parsec. A parsec is equivalent to about 3.26 light years. If a light year is 9.5×10^{17} cm, write the equivalent of one parsec in centimetres, correct to two digits, in scientific notation.

3. The nearest known star is about 4×10^{13} km from the earth. If we take the speed of light as 9.5×10^{17} cm per year, how long does it take the light from this star to reach the earth?

4. The human heart beats an average of 73 times per minute. Write, in scientific notation, the number of times a heart beats in a normal life span of 72 years (2.8×10^9).

5. Express the following lengths in standard form:

   a) 0.000 79 cm, the diameter of a human blood cell
   b) 0.0116, the length of a plant cell
   c) 176 cm, the height of an average man
   d) .008, the thickness of a vinyl liner

B. EQUATION SOLVING

1. Solve each equation:

a) $a + 5 = 10$
b) $b + 6 = 15$
c) $c - 9 = 23$
d) $8 - d = 15$
e) $6 + e = -9$
f) $4f = 20$
g) $2q = 21$
h) $3h = 52$

i) $6a + 4 = 28$
j) $7b + 8 = 36$
k) $3c - 6 = 18$
l) $2d - 5 = 9 + 6$
m) $3m = -16$
n) $8n = 7n + 1$
o) $5a + 3 = 2a - 7$
p) $6a + 1 = 5a$

q) $4m - 2 = 3m - 5$
r) $6x + 5 = 9x + 5$
s) $4y + 528 = 0$
t) $a + 3a = 7a + 15$
u) $6b + 1 + 2b = 4 + 9b$
v) $9 - 2c = 30 - c$
w) $72 - 3n = 84 + 4n$
x) $13 + 5a - 6a = 23 + 7a + 4$
y) $6x - 126 = 0$
z) $2a - 3 + 5a = 4a + 3a$

2. Solve each equation:

a) $3(x + 5) + 4(x + 5) = 21$
b) $2(a + 4) + 3(a + 4) = 40$
c) $15 + (b + 3) + 2(b + 4) = 29$
d) $23 + 2(c-7) - 3(c + 4) = 32$
e) $4(d + 3) - 2(d + 7) = 3(d-6)$
f) $4(e + 11) - 5(e - 8) = 0$
g) $7(f - 16) = 3(f + 4)$
h) $2(5a - 4) - 3(6a + 5) - 10a = 5(3a - 16)$
i) $(x + 5)(x - 4) = (x + 3)(x - 7)$

3. Solve each equation:

a) $\frac{1}{3}a = 27$
b) $\frac{2}{5}b = 4$
c) $\frac{1}{6}c = \frac{1}{2}$
d) $\frac{3}{4}d = -2$
e) $\frac{3}{7}a = -6$
f) $\frac{2}{9}b = \frac{1}{9}$
g) $\frac{3}{7} - \frac{1}{2}c = \frac{2}{7}$
h) $\frac{4}{9} + \frac{2}{3}d = 1$
i) $\frac{a}{2} - \frac{3a}{5} = 2$
j) $\frac{1}{4}b - 3 = -2$
k) $\frac{2}{3}c + 4 = 6$
l) $\frac{d}{4} - 2 = \frac{d}{6} + \frac{d}{8}$
m) $\frac{3a}{5} - \frac{a}{2} = \frac{2}{5} + \frac{3a}{2}$
n) $\frac{3}{2} - \frac{b}{3} = 5 + \frac{b}{6}$
o) $-4 - \frac{1}{4}c = \frac{1}{16}c + 1$
p) $\frac{3d}{2} + \frac{5}{24} = \frac{5d}{8} + \frac{13}{12}$
q) $\frac{a}{6} - \frac{a}{9} + \frac{1}{3} = \frac{3a}{2} - \frac{4}{9}$

4. Solve each equation:

a) $\frac{a + 2}{3} = \frac{2a - 7}{5}$
b) $\frac{4b - 9}{2} = \frac{5 - 3b}{9} - \frac{7}{18}$
c) $\frac{3 - c}{7} = \frac{-6 - 5c}{2}$
d) $\frac{d - 7}{2} - \frac{1}{3} = 1 + \frac{d + 9}{9}$

e) $\frac{3}{4}(3a + 1) - \frac{8}{7}(4a - 8) = -11$

f) $\frac{3b - 10}{7} = \frac{4 - 2b}{3} + 1$

g) $4(2c - 3) + \frac{1}{2}(6 - 7c) = 8 - \frac{2}{3}(4c + 5)$

h) $\frac{2}{3}(d + 5) - \frac{3}{4}(2d - 3) = \frac{1}{2}(6 - 2d) + \frac{1}{3}(7 + 3d)$

i) $\frac{7}{5}(a - 3) + \frac{4}{3}(2a + 1) = 0$

2. I. For each problem, set up an equation in one variable and then solve.

a) Find two consecutive integers whose sum is 35.
b) Two more than three times a number is 23.
c) Five less the four times a number is 23.
d) Find three consecutive integers whose sum is 63.
e) John is 18 years older than Derek. The sum of their ages is 46. How old is Derek?
f) The perimeter of a rectangle is 400. Find the length if it is 2 more than twice the width.
g) Georgina is 10 years older than Marianne. In 3 years she will be twice as old. How old is Georgina now?
h) Pamela is 5 years older than Albertine. Francine is twice as old as Albertine. The sum of their ages is 65. How old is each?
i) Three times one number equals another number. If the sum of the 2 numbers is 64, what is each number?
j) Find each of three consecutive odd numbers if their sum is 237.
k) Find each of three consecutive even numbers if their sum is 378.
l) Find a number such that 2/3 of the number decreased by 9 is 35.
m) Two cars start from the same town and travel in opposite directions. One travels 90 km/hr. and the other travels 100 km/hr. How many hours will have passed when they are 980 km apart?
n) Joanne has $3.78 in coins, consisting of dimes, nickels and pennies. There are twice as many pennies as nickels, and the number of dimes equals the number of pennies. How many of each are there?
o) The body of a certain missile is 12 times the length of the nose cone. If the total length of the missile is 38 metres, find the length of the nose cone.
p) At Winnipeg International Airport, Airline A has 1 1/2 times as many planes as Airline B. Airline C has 1/3 as many planes as A and B together. All three together have 180 planes. How many planes does each have?
q) The sum of 2 numbers is 56. Twice the larger decreased by three times the smaller is 16 more than the smaller number. Find each number.

3-a. 1. Find 3 ordered pairs which satisfy each of the following linear equations:

a) $x + y = 13$
b) $2x + y = 9$
c) $3x - 2y = 4$
d) $5x - y = 12$
e) $x + y = -15$
f) $4x + 5y = -8$
g) $3y - 4x = 9$
h) $y + 6x = 15$

2. For each linear equation, write the ordered pair solutions which have x-values of -2, -1, 0, 1 and 2.

a) $2x + 3y = 6$
b) $3x - 4y = 8$
c) $2y - 5x = -15$
d) $-4y - 4x = 4$

3-b. 1. Decide whether each ordered pair is a solution for the given system of equations:

a)	$2x - 3y = -1$ $x + 4y = 16$	(4,3), (3,4)
b)	$x - 3y = 8$ $2x + y = 11$	(5,-1), (-1,5)
c)	$y - 2x = 6$ $x + 3y = -7$	(-6,3), (3,-6)
d)	$2x - 3y - 1$ $3x + 2y = -18$	(-4,-3), (4,3)
e)	$2x + y = 8$ $4x - 9y = 5$	(7/2,1), (2,4)
f)	$3x + 2y = 1$ $2x - 3y = -8$	(-2,1), (-1,2)

3-c. 1. Graph the following systems of equations and determine the solution (point of intersection) for each system.

a) $x - y = 5$
$3x + 2y = 25$

b) $x + 4y = -1$
$2x - 3y = 9$

c) $3x - 2y = 0$
$4x + y = -11$

d) $5x + 6y = -3$
$2x - 2y = -10$

e) $3x + 5y = -21$
$x - 4y = -7$

f) $4x - 6y = 3$
$3x + 8y = -4$

g) $5x - 3y = 8$
$-10x + 6y = 4$

h) $x + 3y = 4$
$2x + 6y = 8$

i) $-x + 2y = 2$
$x - 2y = 6$

j) $2x - 3y = 4$
$-2x + 3y = -4$

k) $\frac{2x + 3}{6} - y = \frac{1}{6}$

$3x + 2y = 16$

l) $x = 4$
$y = 5$

m) $y = -3$
$x + 2 = y$

n) $x = 7$
$2x - y = 10$

3-d. 1. Solve each of the following systems of equations, using an algebraic method:

a) $3x - 4y = -6$
$3x + 2y = 12$

b) $4x + 3y = -5$
$x + 3y = -8$

c) $x + 2y = -6$
$2x + y = -6$

d) $5x + 7y = 5$
$x - 3y = 1$

e) $3x - 2y = 10$
$x + y = -5$

f) $8x - 5y = 0$
$5x - 8y = 0$

g) $6x + 9y = 6$
$8x - 3y = 3$

h) $4x - 7y = 0$
$2x + \frac{7}{2}y = 1$

i) $6x + 8y = 6$
$3x - 12y = -1$

j) $7x - 9y = -6$
$-2x + 3y = +6$

k) $4x + y + 8 = 0$
$5x - 2y + 23 = 0$

l) $\frac{1}{4}x - 2y = 1$
$3x + 4y = 12$

m) $x - \frac{y - 2}{3} = 0$

$\frac{2}{10}x + \frac{3}{10}y = 5$

n) $.3x - .4y = 5$
$2x + 5y = 52$

o) $3x - 4y - 1 = 3(2x - y + 2)$
$2(4x + 2y + 3) = 7x + y + 9$

p) $2(2x + 5y - 7) = 13y - x - 9$
$3(5x - 2y - 1) = 3(3x + 2y) - 13(y - 2$

q) $y = -6$
$3x + 4y = -12$

r) $x = 7$
$2x - 5y = -1$

s) $\frac{x + y}{5} + \frac{y - x}{5} = 4$

$\frac{2x + y}{10} - \frac{x + 2y}{5} = -3$

t) $\frac{2x + y}{7} + \frac{x - y}{10} = 39$

$\frac{x - 2y}{5} - \frac{3x - 2y}{7} = -32$

u) $\frac{x}{8} - \frac{4}{9} = -1$

$\frac{2x}{3} + \frac{3y}{4} = 43$

v) $x = 15$
$y = -7$

4. 1. Solve each problem by first writing a system of equations to represent the problem and then solving the system of equations.

a) The sum of two numbers is 28. Their difference is 8. Find the numbers.
b) The sum of two numbers is 250. Their difference is 68. Find the numbers.
c) The sum of two numbers is 38. Twice the smaller added to three times the larger is 106. Find the numbers.
d) The difference of 2 positive numbers is 24. Three times one number added to twice the other is 92. Find the numbers.
e) The manager and his assistant are to share a bonus of $1200. The manager's share of the bonus is three times the amount of the assistant's share. How much does each receive?
f) 340 people bought tickets to the high school drama. Each adult paid $3.00 and each student paid $1.25. The total collected was $708.50. How many adults attended the drama?
g) A child's piggy bank contained $5.24 in nickels and pennies. The number of pennies exceeded the number of nickels by 176. How many of each were there?
h) The accountant of A. B. Company made a deposit in the local bank consisting only of one-dollar and five-dollar bills. There were 357 bills totalling $1125. How many of each were there?
i) Two trains leave Winnipeg, one going west, the other going east. The second train is travelling 15 km/hr. faster than the first. After 5 hours, the trains are 775 km apart. What is the speed of each?
j) The cost of 3 dozen eggs and 4 pounds of butter is $12.35, while the cost of 4 dozen eggs and 3 pounds of butter is $11.45. What is the cost of 2 dozen eggs and 2 pounds of butter?
k) The perimeter of a rectangle is 32 centimetres. The length is 2 centimetres less than twice the width. Find the length of the diagonal of the rectangle.
l) A merchant wishes to prepare a mixture of 20 kg of candy to sell at $4.50 per kilogram. To do this he mixes some candy which sells for $3.75 per kilogram with candy that sells for $6.00 per kilogram. How much of each should he use?
m) A man bought $16.80 worth of stamps. Three times the number of 60-cent stamps was equivalent to twice the number of 30-cent stamps. How many of each did he buy?
n) A number, less than 100, has its tens-digit 2 more than its units-digit. If the number with its digits reversed is subtracted from the number itself, the difference is 2 more than twice the sum of the digits. What is the number?

C. GRAPHING

Direct Linear Relations

1. 1. Zero an ordinary pan-balance with a container on one side. Add marbles (uniform in size) to the container, recording the mass after each marble.

   2. Repeat the above experiment, using different substances (example, scoops of sand, beads, iron shot, etc.).

   3. Stack 10 to 12 texts (uniform in size) on top of each other. Record the height of the stack after each book is added.

2. 1. Graph the data obtained in the previous experiments.

   2. Graph the following data:

a)

Number of Apples	0	1	2	3	4	5	6	7	8	9	10
Price in Cents	0	35	70	105	140	175	210	245	280	315	350

Cost of Apples in a Cafeteria

b)

Distance in km	0	10	20	30	40	50	60	70	80	90	100	120
Time in minutes	0	10	20	30	40	50	60	70	80	90	100	120

A car travelling at a uniform speed of 60 km/hr.

c)

Number of bottles	0	2	4	6	8	10	12	14	16	18	20
Capacity in mL	0	1500	3000	4500	6000	7500	9000	10 500	12 000	13 500	15 000

The capacity of one bottle of soda is 750 mL

3. In each of the following, plot the graph to illustrate the given information.

   a) The cost per pencil is 50 cents (from o to 12 pencils).
   b) The initial temperature is 0°C and the temperature increases 8°C each half hour over an interval of 5 hours.
   c) The distance travelled from 0 to the 10th second by an object travelling at a uniform rate of 20 m per second.

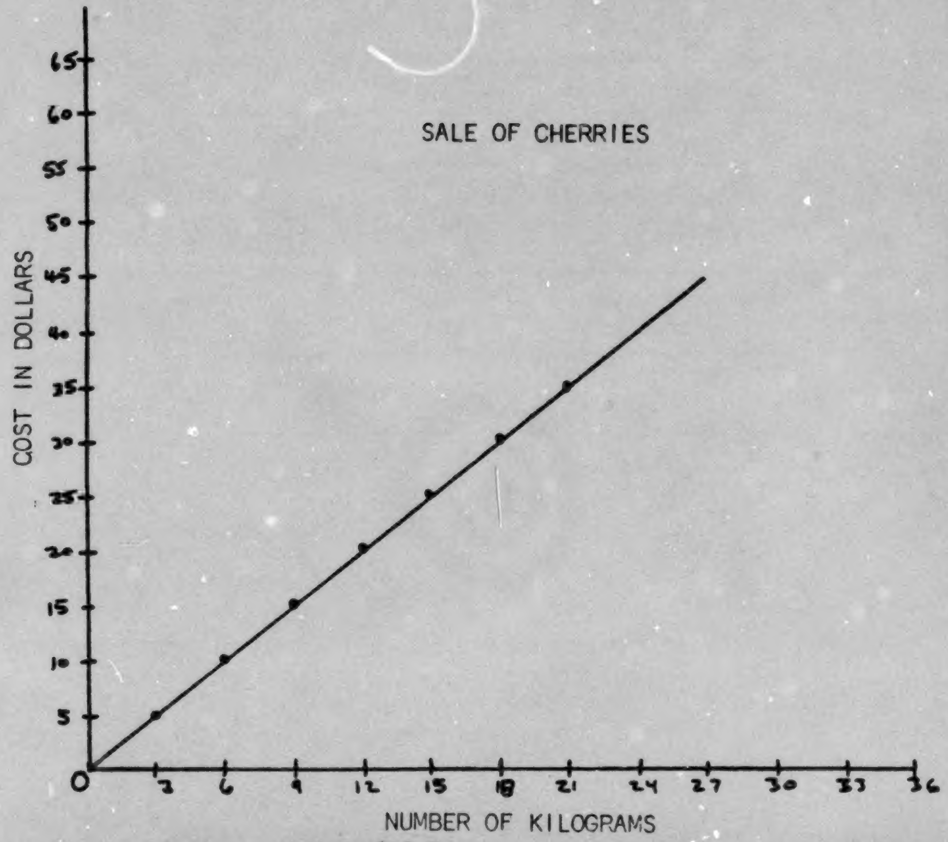
4. 1. Using the information from question 2(b) of 2., how many km would the car have travelled after (a) 15 minutes?
(b) 93 minutes?
(c) 150 minutes?

2. Using the information from question 2(c) of 2., what is the capacity of (a) 7 bottles of soda?
(b) 15 bottles of soda?
(c) 24 bottles of soda?
(d) 21 bottles of soda?

3. Using the information from question 3(b) of 2., what would the temperature be after (a) 45 minutes?
(b) 2 hours, 15 minutes?
(c) 5 1/2 hours?

4. Using the information from question 3(c) of 2., how far will the object have travelled after (a) 7.5 seconds?
(b) 12 seconds?

5\.



a) How much will 6 kg of cherries cost?
b) How much will 10.5 kg of cherries cost?
c) How much will 7 kg of cherries cost (approx.)?
d) How much will 20 kg of cherries cost (approx.)?
e) How much will 36 kg cost?

5. 1. Write an equation to express the data from questions #1 and #3 of section 1.

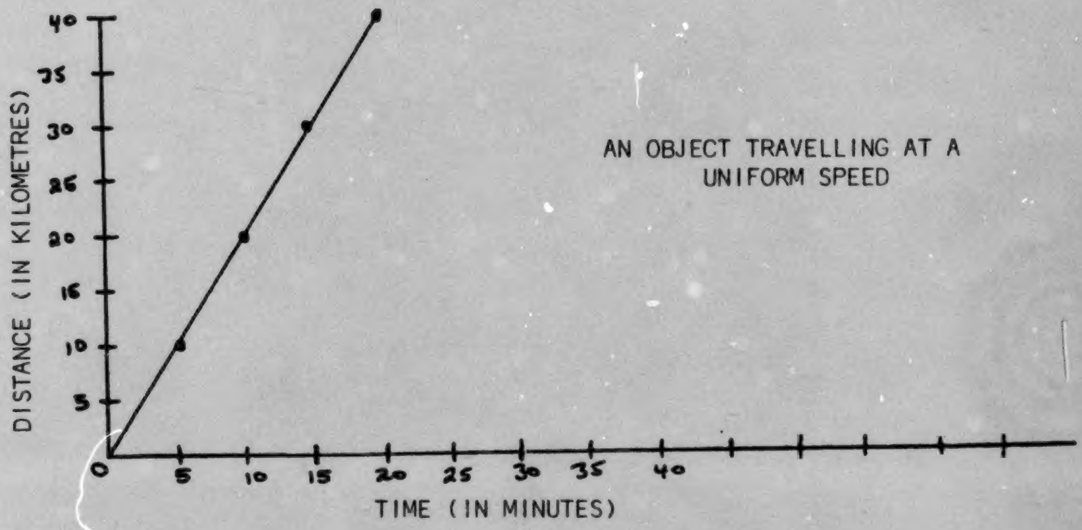
2. Write an equation to express the data from question #2 (a) to (c) of section 2.

3. Write an equation to express the data from question #3(a) to (c) of section 2.

4. Write an equation to express the following data:

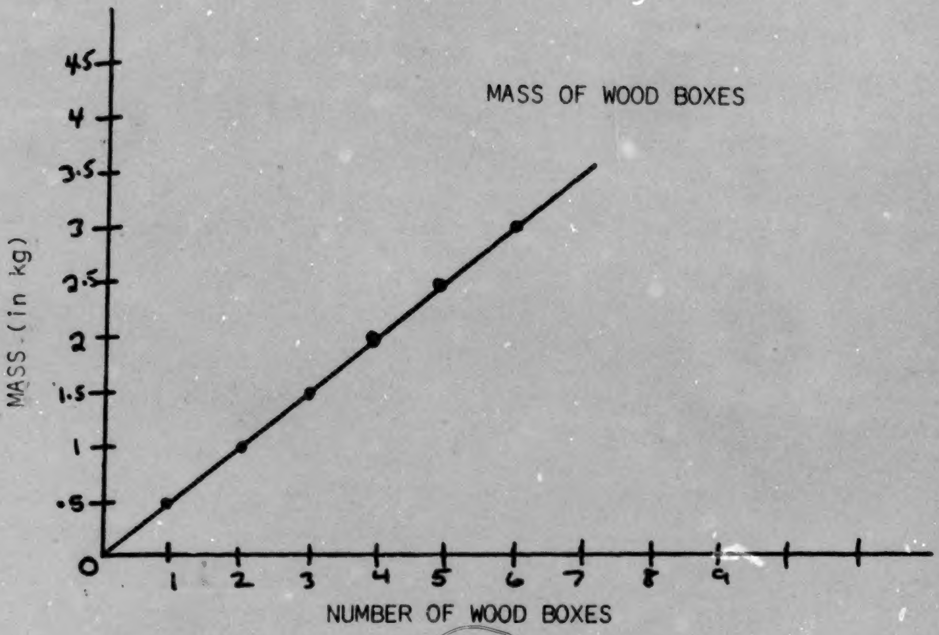
Cost (in dollars)	0	16	32	48	64	80	96	112
No. of Footballs	0	1	2	3	4	5	6	7

5. Write an equation to express the data represented by the following graph:



AN OBJECT TRAVELLING AT A UNIFORM SPEED

6. Write an equation to express the data represented by the following graph:



6. 1. Graph the following linear relations.

a) $y = 3x$
b) $5x = y$
c) $y = x$
d) $y = 0.4(x)$
e) $y = 1.25(x)$
f) $y = 1/2\ x$
g) $y = \frac{3x}{4}$
h) $y = \frac{x}{3}$
i) $2y = 12x$
j) $5y = x$
k) $y - 2x = 0$
l) $4x - y = 0$
m) $4y - 8x = 0$
n) $5x - 3y = 0$
o) $3y - 2x = 0$

Partial Linear Relations (4 periods)

1. I. Obtain data through experimentation.

a) Given a graduated cylinder containing a stone, have students add equal amounts of water (i.e., 100 ml at a time). Have students measure the height of the water columns.

b) Given a student standing on a kilogram scale, have the student hold an increasing number of books, and measure mass of student and books, as each book is added.

c) Given a beaker (1 L) of water at room temperature (21°C), allow a bunsen burner to heat water and record temperature at frequent, regular intervals.

d) Calculate the cost of a volleyball trip for up to 10 persons, given a $400 rental fee for a van and $20 expenses for each person.

2. I. Graph the following sets of data.

a) Weight of student alone 68 kg.
" " " with 1 book 69.5 kg
" " " with 2 books 71 kg
" " " with 3 books 72.5 kg
" " " with 4 books 74 kg
" " " with 5 books 75.5 kg
" " " with 6 books 77 kg

b) Water in beaker at room temperature 21°C
Water after 2 minutes 23°C
Water after 4 minutes 25°C
Water after 6 minutes 27°C
Water after 8 minutes 29°C
Water after 10 minutes 31°C
Water after 12 minutes 33°C
Water after 14 minutes 35°C

c) Graph data from 1(d)

4. I. a) Using data collected in 2-1(a):
(i) What is the weight of each book?
(ii) What would be the weight of the same person with 12 books?

b) Using data collected in 2-1(b):
   (i) What would the water temperature be after 5 minutes?
   (ii) What would the water temperature be after 9 1/2 minutes?
   (iii) What would the water temperature be after 20 minutes?
   (iv) What is the heat gain per minute?

c) Using data from 1-1(d):
   (i) What would the total cost of the trip be with 12 people?
   (ii) What would the cost per person be for a trip with 8 people?
   (iii) What would the cost per person be for a trip with 6 people?

5. 1. a) Determine an equation to express the data obtain in 2-1(b), 2-1(c) and 1-1(d).

b) The cost of a carpentry job includes $45 for power hammer rental plus 100 nails. Additional nails are purchased according to the following schedule:

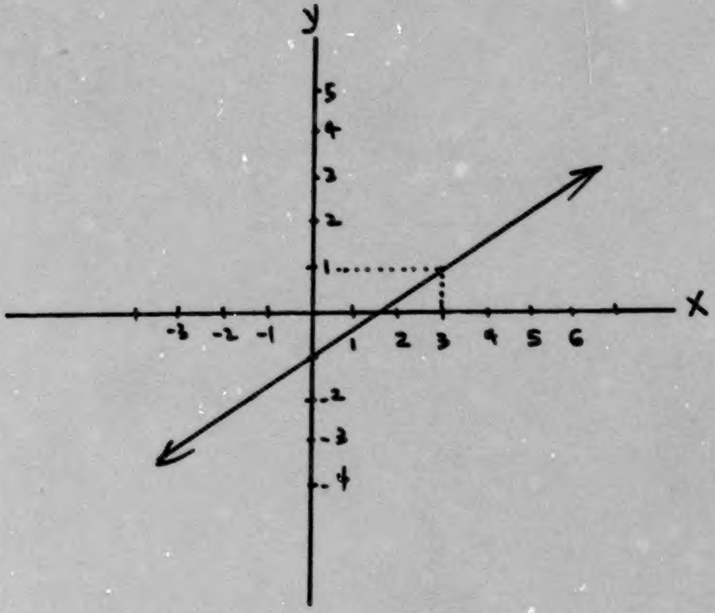
101-200	$2.95
201-300	5.90
301-400	8.85
401-500	11.80
501-600	14.75
601-700	17.70
701-800	20.65
801-900	23.60
901-1000	26.55

Writen an equation relating total cost to the number of nails required. Estimate the cost of renting the hammer and using 750 nails.

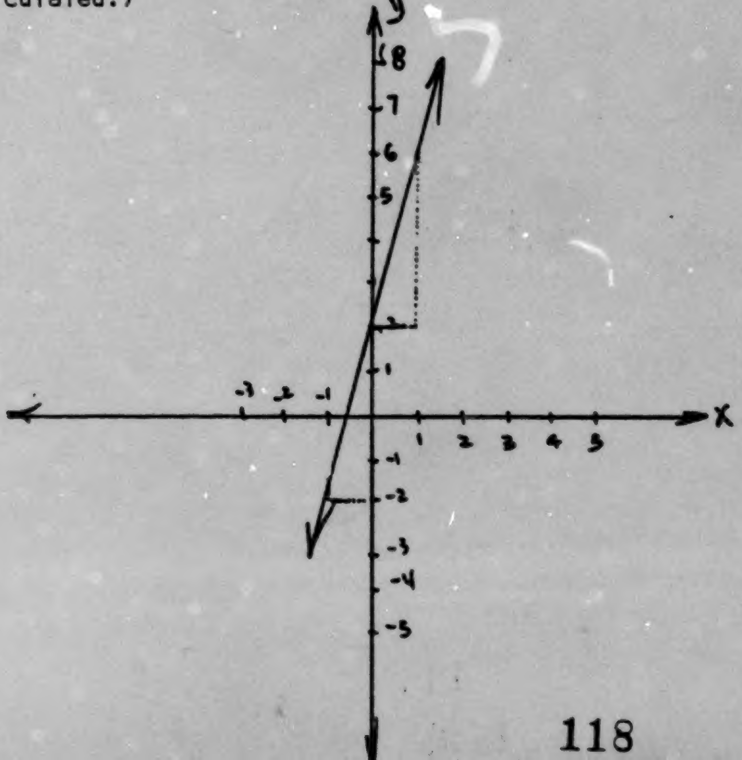
6. 1. a) Given the following equations:
   - rewrite each in the form $y = mx + b$
   - graph each equation

i) $4y = 3x - 10$
ii) $2y + 4y = 8$
iii) $6x - y = 3$
iv) $8x + 2y + 2 = 0$

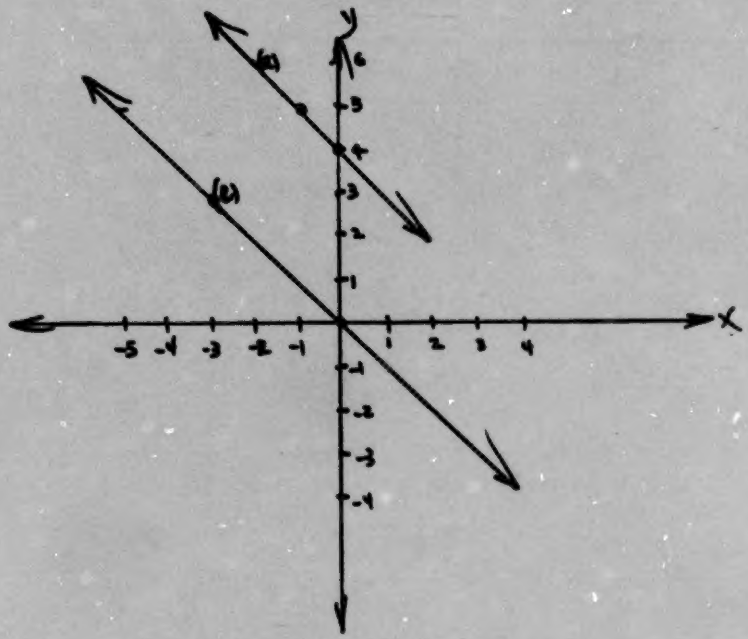
b) Write an equation in the form y = mx + b for this graph.



2. Write an equation in the form y = mx + b for this graph. (There are 2 places on this graph where slope could easily be calculated.)



3. (a) Write equations for both lines shown.
   (b) Sketch the graph for a line with the same slope as those shown and with a y- intercept of -4.
   (c) These lines are all ____________________.



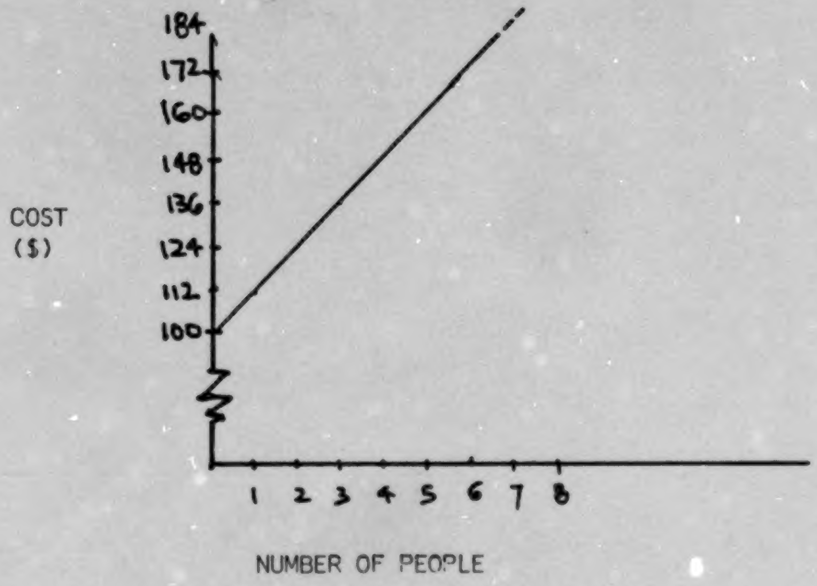
7. 1. a) Write an equation in the form y = mx + b for the straight line whose slope is -2 and whose y- intercept is -5.

   b) Write an equation in the form y = mx + b for the straight line whose slope is 4/3 and which passes through the point (0, -3).

   c) Write an equation in the form y = mx + b for the line passing through points (0,4) and (-4,-5).

   d) Write an equation in the form y = mx + b for the line passing through points (6,2) and (8,-3).

2. a) The accompanying chart indicates how the cost of providing a dinner is related to the number of people. Determine the equation for the straight line relationship.



b) At a Winnipeg car rental agency, a rate of $28 per weekend plus 8¢/km is offered. Graph the straight line and write an equation in the form y = mx + b for the line. From your equation, what would be the cost of the car for a weekend if the car was driven for 650 km? 1000 km?

c) In a certain form of test, a student has an initial mark of 100 with marks deducted for every error. If marks are deducted at a rate of 3 for every mistake, produce a graph of the straight line that represents this situation. Write an equation that properly expresses this relationship. From your equation, calculate the minimum number of errors which will produce a failure (less than 50).

Non-Linear Relations (2 periods)

1. a) The space shuttle, upon lift-off, is very slow. However, as it burns tonnes of fuel, it accelerates to thousands of kilometres per hour due principally to the fact that it is free of gravity's pull. The following data represents velocity against time.

Time (seconds)	1	2	3	4	5	6	7	8	9	10	11	12
Velocity (m/sec)	.21	.48	1.1	1.6	2.2	3.4	5	6.3	8.3	10.5	14.3	20

Plot the points and join them with a smooth curve.

b) The formula, $d = 1/2\ at^2$, describes the relationship of an object in free fall (wind resistance ignored). The distance fallen (d) equals the product of one-half the constant of acceleration (9.8) and the time required. For example, the distance dropped after 2 seconds is:

$$\begin{aligned} d &= 1/2(9.8)(2)^2 \\ &= 1/2(9.8)(4) \\ &= 19.6 \end{aligned}$$

Given an object in free fall for 6 seconds, prepare a graph of the distance fallen vs. time.

c) For any object thrown horizontally from a tower, the lateral velocity remains constant until the object hits the ground (ignoring air resistance). However, due to gravity's pull, the object begins to accelerate downwards upon release. Present a graph to show the behaviour of a ball thrown horizontally at 10 m/sec which remains in the air for 4 seconds. (Note: downward movement is expressed by $d = 1/2\ at^2$ where $a = 9.8$.)

2. a) From the data in 1(a), how long did it take the shuttle to reach a velocity of 15 m/sec? 30 m/sec?

b) Based on the data in 1(b), how far do you expect something to drop after 7 seconds? 10 seconds?

c) From the data in 1(c), how far horizontally would the object travel if it was airborne for 8 seconds?

D. VARIATION

Direct Variation

For each of the following, state whether it is or is not an example of direct variation.

1. The velocity of a body falling from rest varies directly with the time of fall.
2. The distance a body falls from rest is directly proportional to the square of the time of fall in seconds.
3. The volume of a sphere varies directly as the cube of the radius.
4. The volume of a given mass of gas varies inversely with the pressure.

5.

X	Y
4	12
5	15
6	18
7	21

6.

X	Y
1	5
2	6
3	7
4	8

7.

X	Y
5	20
7	28
9	36
11	44

8.

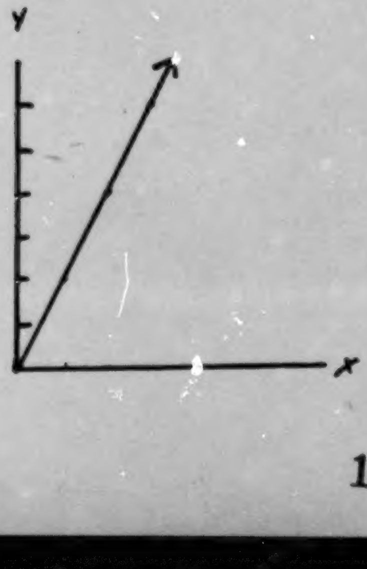
X	Y
0	1
1	2
2	5
3	10

9.

X	Y
0	0
1	2
2	8
3	18

10. $b = 3a$
11. $y = 2x^3$
12. $y = x^2 + 4$
13. $d = M/3$

14.



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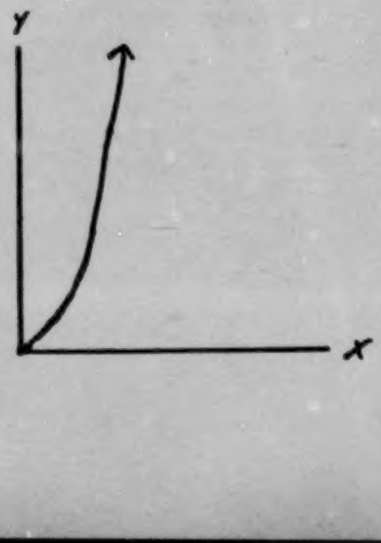

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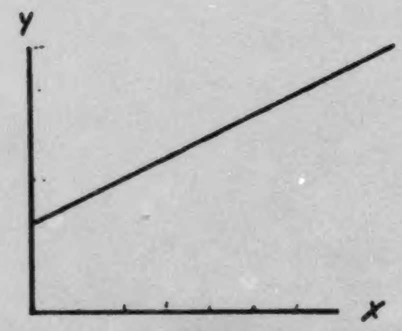

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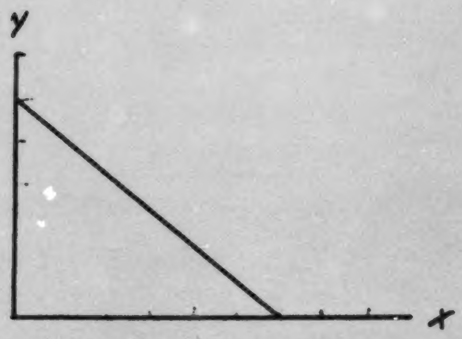


2. For each of the following, determine the constant of variation.

1. A diesel truck burned 160 L of fuel while travelling 1000 km.
2. A team purchased 6 volleyballs for $240.
3. Eight new Math texts cost $96.
4. y varies directly with x. Y is 16 when x is 4.
5. $d = \frac{5}{2}c$
6. m = an
7. b varies directly with the square of a. b is 20 when a is 2.
8. Twenty meals at a banquet cost $90.
9. d varies directly as c. d is 6 when c is 12.
10. $150 purchases 50 golf balls.

3. Solve the following problems:

1. A small engine burned 4 litres of fuel in 2 hours. How many litres would it burn in 10 hours?
2. An elevator rose 150 m in 2 minutes. How long would it take to rise 450 m?
3. y varies directly as x. y is 10 when x is 4. Find y when x = 6.
4. a varies directly as the square of b. a is 18 when b is 3. Find a when b is 5.
5. The mass of a metal sphere varies directly as the cube of the diameter. A sphere with d = 6 cm has a mass of 120 g. What is the mass when d = 2 cm?
6. The distance through which an object falls from rest varies directly as the square of its time. An object falls 45 m in 3 seconds. How far does it fall in 5 seconds?
7. The time in seconds for one swing of a pendulum varies directly as the square root of the length in centimetres. If a 100 cm pendulum swings once in 2 seconds, what time is required for a swing of a 64 cm pendulum?

4. Direct variations can be expressed in four ways:

- word statement
- equation
- graph
- chart

For each of the following, express the variation in the other three forms:

1. $y = \frac{3}{2}x^2$
2. $m = 4f$
3. n varies directly with the square root of m
4. q varies directly with the cube of b

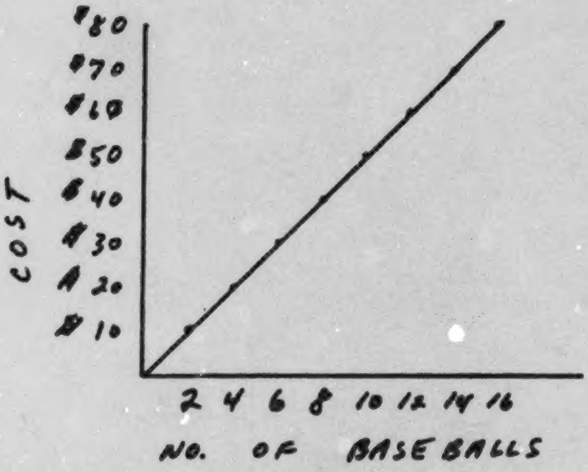
5.

f	t
1	2
2	8
3	18
4	32

6.

x	y
0	0
1	2.5
2	5
3	7.5

7.



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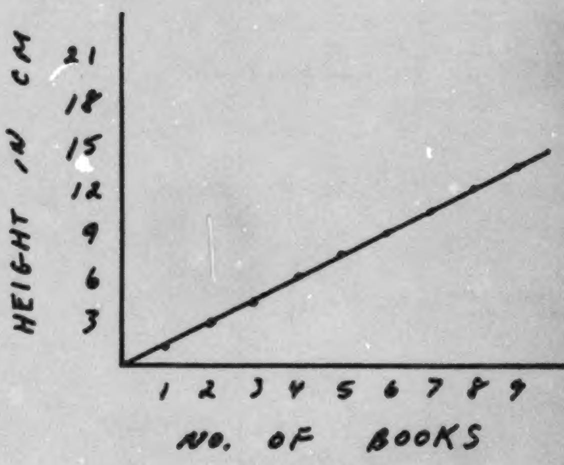


Partial Variation

1. Identify those problems which involve partial variations.

1. The cost of printing sale bills 100 cm by 40 cm is \$70 plus \$20 per hundred posters.

2. The distance a hiker travels depends on the rate of speed and the time.

3. The rent of an arena used for hockey games is \$100 plus 20% of the ticket revenue.

4. $p = 40 + 3q$

5. $y = 4x^5$

6. $m = 10 + .3n$

7. $y = 2x^2 + 4$

8.

No. of passengers	Cost
0	200
10	300
20	400
30	500
40	600

9.

x	y
0	0
1	1
2	2
3	4.5
4	8

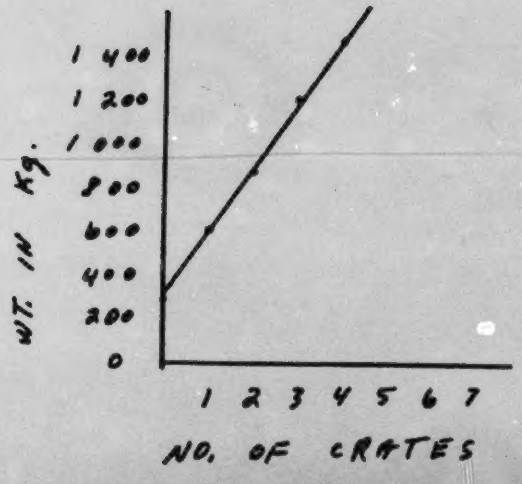
10.

a	b
1	12
2	14
3	16
4	18
5	20

11.

c	d
0	3
1	4
2	7
3	12
4	19

12.



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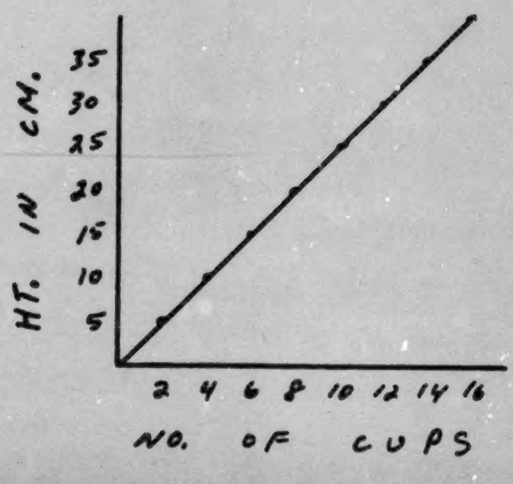

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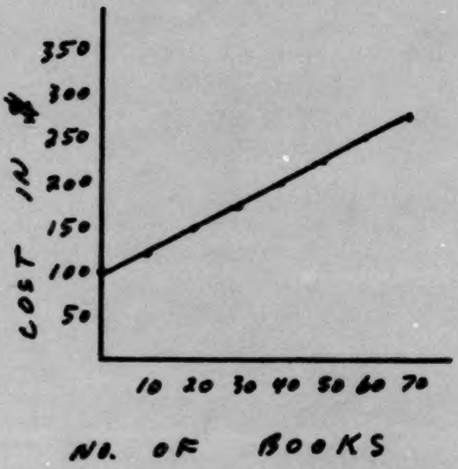


2.3. For each of the following, determine the constant of variation and solve the problem.

1. The cost of taking a group on an excursion was quoted at $300 if 10 people went and $600 for 40 people. What would it cost if 25 people decided to go? (The total cost is based on a fixed cost plus so much per person.)

2. The weight of the load for a truck hauling crates of parts depends upon the weight of the truck and the number of crates carried (each crate weighs same amount). A truck carrying 6 crates weighs 5000 kg while a truck carrying 10 crates weighs 7000 kg. What would the truck weigh if it carried 11 crates?

3.

x	y
2	12
4	18
6	24
8	30

Find y if x = 14

4.

q	d
1	22
3	38
5	70
6	92

Find d if q = 2

5. The cost of a trip to play basketball is based on a fixed cost plus a given amount per person going. The cost for 18 people is $85.50, and the cost for 26 people is $103.50. What would be the cost for 29 people?

6. The cost of sowing a crop is determined by a fixed cost plus a given amount per hectare sowed. 200 hectares cost $23 000 to sow and 400 hectares cost $45 000.
   a) What would it cost to sow 270 hectares?
   b) How many hectares could be sowed for $34 000?

7. The cost of butchering hogs is determined by a fixed fee plus an additional fee for each hog. 20 hogs cost $600 to butcher and 70 hogs cost $1600.
   a) What would it cost to butcher 38 hogs?
   b) How many hogs were butchered if the cost was $1060?

Inverse Variation

I. Identify those problems which involve inverse variation.

1. The number of meals one can purchase with a given sum of money varies inversely as the cost of each meal.

2. $y = \frac{k}{x}$

3. $y = 2x$

4. The total cost of cleats for a baseball team is determined by the number of pairs of cleats needed.

5. The time required to drive a given distance varies inversely with the rate of speed.

6. $L = \frac{144}{d^2}$

7. $y = \frac{a^2}{4}$

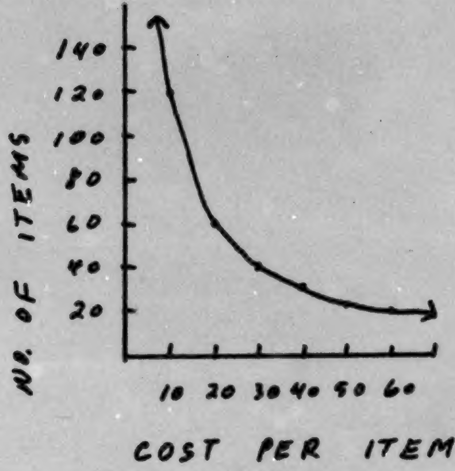
8.

a	b
10	120
20	60
30	40
40	30

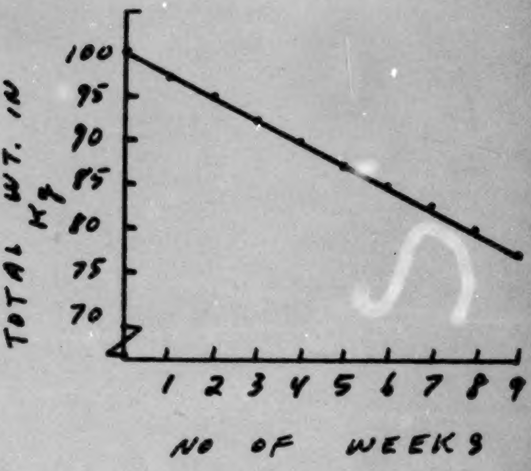
9.

q	y
6	50
10	30
12	25
15	20

10.



11.



2.3. For each of the following, determine the constant of variation and solve the problem.

1. The time, in hours, required to cover a given distance varies inversely as the rate of speed. If a motorist took 7 hours to cover the distance when driving at a rate of 80 km/hr., how long will it take if he drives at a rate of 100 km/hr.?

2. Given: m varies inversely with d
   m = 10 if d = 30

   a) Find the constant of variation.
   b) Find d if m = 20.
   c) Find m if d = 30.

3. The voltage in a circuit varies inversely with the resistance. In a circuit of given voltage, the current is 2 amps when the resistance is 3 ohms. What is the resistance if the current is 6 amps?

4. The number of meals one can purchase at a banquet varies inversely as the cost of the meal. If 200 meals cost $6 each, what would be the cost of each meal if 150 meals were ordered?

5. The time required to complete a construction project is inversely proportional to the number of men working. If 24 men take 30 days to do the job, how long would 36 men take?

6. m varies inversely with n, and m = 25 when n = 9. What is the value of m when n = 15?

7. The amount a rectangular beam of fixed length bends varies inversely with the cube of its depth. A 50 mm by 100 mm (2 x 4) stud 4 m long sags 12.7 mm under a given load. How much would a 50 mm x 150 mm (2 x 6) stud 4 m long bend under the same load?

Mixed Variation

1. For each of the following, identify each as a direct, partial, or inverse variation and solve the problem.

   1. The number of blows one receives is dependent upon the number of bad jokes one tells. If a joker received 6 blows for 2 bad jokes, how many blows would he receive for 3 bad jokes?

   2. The number of spherical shot needed to fill a box varies with the cube of the radius of the shot. When r = 3 mm, n = 1000 shot. How many shot can be held if the radius is 5 mm?

   3. The cost of holding a rally for a basketball game is a fixed sum plus an additional sum for each person attending. If $120 was charged when 100 people attended and $137.50 for 125 people, what would the charge have been for 150 people?

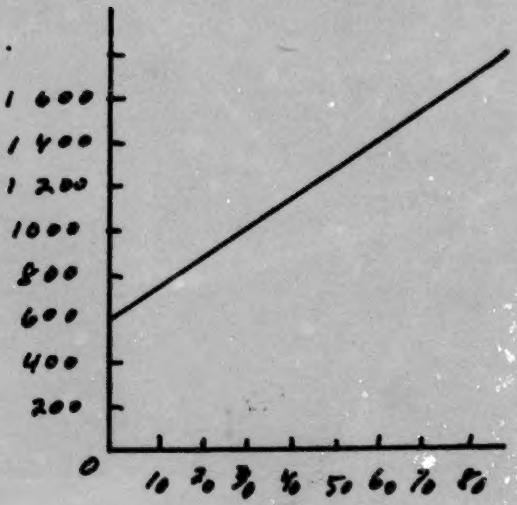
   4. If a Canadian dollar is worth $0.785 U.S., what would it cost to purchase $1,000 U.S. dollars?

   5. The romantic attraction between compatible males and females varies inversely with the square of the distance between them. If the strength of the attraction is 1600 loving at 4 m, what would the strength of the attraction be at .5 m?

   6. Cab fare is determined by adding so many cents per km to a fixed charge. If a ride of 4 km cost $3.25 and one of 8 km cost $5.50, what would a ride of 5 km cost?

For each of the following, identify the type of variation.

1.


1 600
1 400
1 200
1000
800
600
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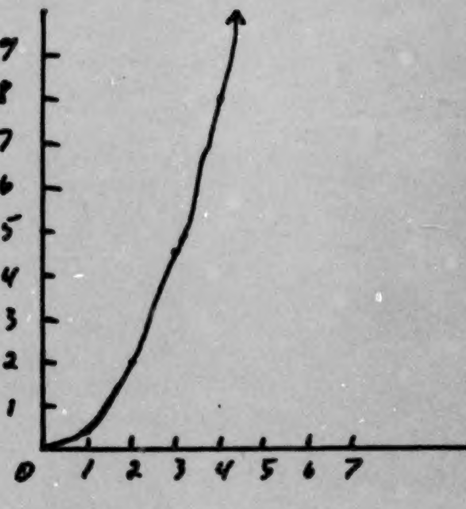
10
20
30
40
50
60
70
80

2.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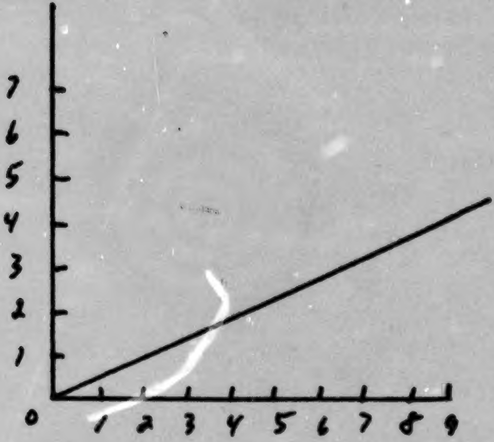
3.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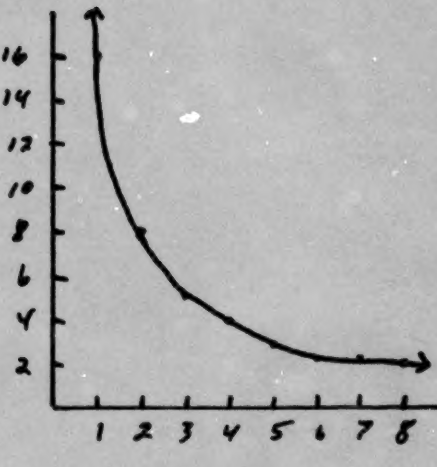
4.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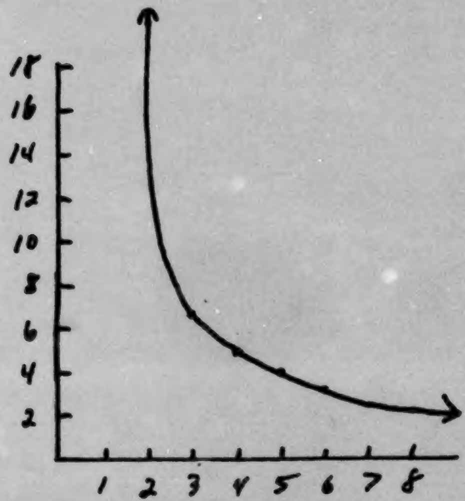
5.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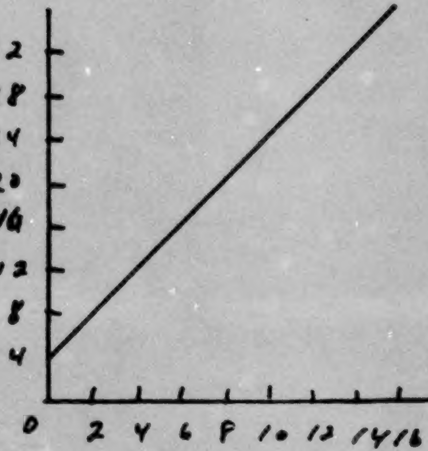
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24
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16
12
8
4
0
2
4
6
8
10
12
14
16

C.11. ALGEBRA - ANSWERS

A. ALGEBRAIC OPERATIONS

1.

1\.
- a) 16
- b) 125
- c) 64
- d) 1
- e) 3
- f) 16
- g) -27
- h) 16

2\.
- a) 3^5
- b) 4^{11}
- c) 2^{13}
- d) 7^{13}
- e) 5^{11}
- f) 2^{12}
- g) 3^{12}
- h) t^9
- i) x^8
- j) m^{11}
- k) t^9
- l) b^{18}

3\.
- a) 36
- b) 100
- c) 1
- d) 343
- e) 32
- f) 9
- g) 5
- h) 9
- i) x^4
- j) a^7
- k) n^4
- l) w^{10}

4\.
- a) 1/8
- b) 1/9
- c) 1/64
- d) 1/64
- e) 1/6
- f) 1/128
- g) 1/256
- h) 1/729

5\.
- a) 9
- b) 1/2
- c) 4
- d) 1/4
- e) 64
- f) 2
- g) 6561
- h) 2
- i) 1/3
- j) 1/16
- k) 1/32
- l) 1/1000
- m) 6561
- n) 4096
- o) 6
- p) 1/3

2.

1\.
- a) 13a
- b) 16x
- c) 7m
- d) -7t
- e) 7x + 3
- f) 36 - 26x
- g) $a^2 - 5a - 1$
- h) 2x - 12
- i) 1 + 15x
- j) 8x + 15
- k) 9x - 13
- l) 2x - 5
- m) 9x - 1
- n) $a^2 + 5a - 5$

2\.
- a) 14x
- b) $12x^3$
- c) $-20a^4$
- d) $48b^5$
- e) $-21m^4$
- f) $6x^5$
- g) $-30a^8$
- h) $56m^{12}$
- i) 12x + 20
- j) 30x - 42
- k) $-21m^2 - 28m$
- l) $24t^4 + 12t^3$
- m) $x^2 + 8x + 15$
- n) $a^2 + a - 30$
- o) $t^2 + 14t + 4q$
- p) $66^2 - 8b - 8$
- q) $10m^2 - 17m - 20$
- r) $9x^2 - 25$

3\.
- a) 11a + 2
- b) -66 + 50
- c) 3m + 5
- d) -44m + 12
- e) $-2t^2 + qt$
- f) $5x^3$
- g) $2m^3$
- h) $2z^6$
- i) $8m^3 + 2m$
- j) $2w^3 + 3w^2$
- k) $9m^6 - 14m^3 + 23$

4. a) $-5x - 3$
b) $12x^2 + 20x + 8$
c) $21a - 6$
d) $15m + 4$
e) 16
f) 15
g) $6x^2 - 10$
h) $x + 3$
i) $a^2 - 2^2 - 35$
j) $16x + 8$
k) $9x^2 - 12x - 5$

3. a) 3.6×10^4
b) 7.3×10^3
c) 8.2×10^7
d) 1.25×10^9
e) 8.3×10^7
f) 2.3×10^{10}
g) 1×10^{20}
h) 1×10^{12}
i) 8.1×10^5
j) 2×10^{14}

4. a) 3.4×10^{-3}
b) 5.6×10^{-4}
c) 8×10^{-8}
d) 9.4×10^{-3}
e) 7.05×10^{-7}
f) 9.58×10^{-1}
g) 6.753×10^{-6}
h) 1.3×10^{-3}
i) 6.25×10^{-4}
j) 7.36×10^{-14}

5. 1. a) 34 600 000
b) 0.001 15
c) 86 000
d) 0.000 003 04
e) 0.000 888
f) 100 900 000
g) 450 000
h) 0.000 000 033
i) 1 000 000
j) 7 820 000

2. 3.1×10^{18}
3. 4.2 years
4. 2.8×10^9
5. a) 7.9×10^{-4}
b) 1.16×10^{-2}
c) 1.76×10^2
d) 8.0×10^{-3}

B. EQUATION SOLVING

1. 1. a) 5
b) 9
c) 32
d) -7
e) -15
f) 5
g) 10.5 (21/2)
h) 17.3 (52/3)
i) 4
j) 4
k) 9
l) 10
m) -5.3 ($\frac{16}{3}$)
n) 1
o) -3.3 ($\frac{10}{3}$)
p) -1
q) -3
r) 0
s) -132
t) -5
u) -3
v) -21
w) -1.71 ($-\frac{12}{7}$)
x) -1.75 ($\frac{7}{4}$)
y) 21
z) $\emptyset$

2. a) -2
b) 4
c) 1
d) -35
e) 16
f) 84
g) 31
h) 1.73 (57/33)
i) -0.2 ($-\frac{1}{5}$)

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3. a) 81
b) 10
c) 3
d) -2.6(-8/3)
e) -14
f) -0.5 (1/2)
g) 0.285 (2/7)
h) 0.83 (5/6)
i) -20
j) 4
k) 3
l) -48
m) -0.285 (-2/7)
n) -7
o) -16
p) 1
q) 0.538 (7/13)

4. a) 31
b) 2
c) -1.45 (-48/33)
d) 15
e) 9
f) 3.43 (79/23)
g) 1.91 (82/43)
h) 0.3 (3/10)
i) 0.705

2.

a) 17,18
b) 7
c) 7
d) 20,21,22
e) J = 32, D = 14
f) 134
g) 17
h) A = 15, P = 20, F = 30
i) 16, 48
j) 77, 79, 81
k) 124, 126, 128
l) 66
m) 5.16 (98/19)
n) n=14, P=28,d=78
o) 2.92 m (38/13)
p) A=81, B=54, C=45
q) 40,16

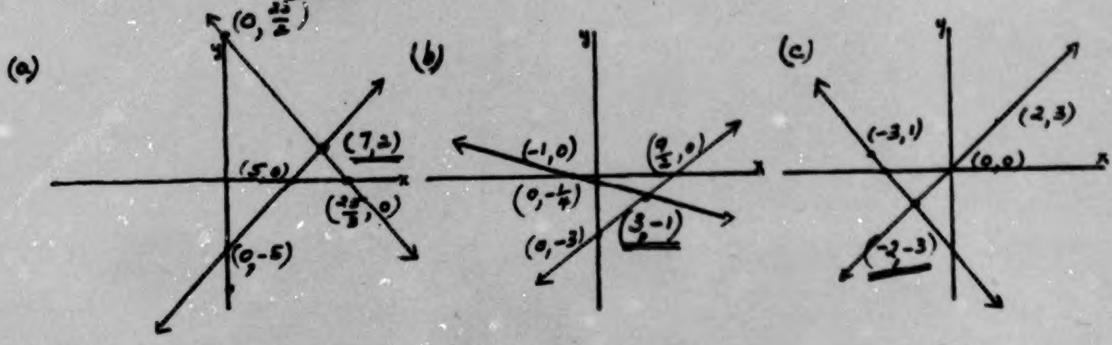
3-a.

1. Answers will vary.
2. a) (-2, 10/3), (-1, 8/3), (0, 2), (1, 4/3), (2, 2/3)
b) (-2, 7-7/2), (-1, -11/4), (0, -2), (1, -5/4), (2, -1/2)
c) (-2, -25/2), (-1, -10), (0, -15/2), (1, -5), (2, -5/2)
d) (-2, 1) (-1, 0), (0, -1), (1, -2), (2, -3)

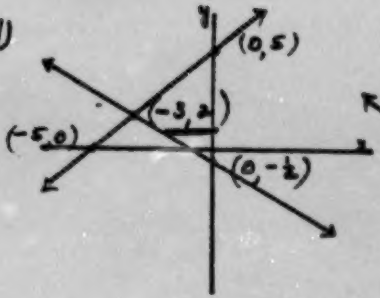
3-b.

a) (4,3) is
b) neither
c) neither
d) (-4,-3) is
e) (7/2, 1) is
f) (-1, 2) is

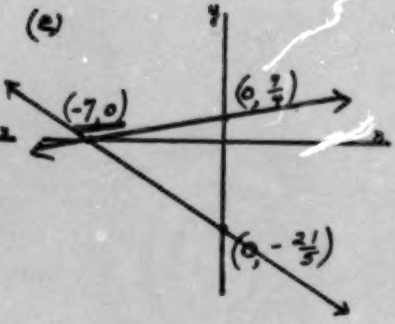
3-c.



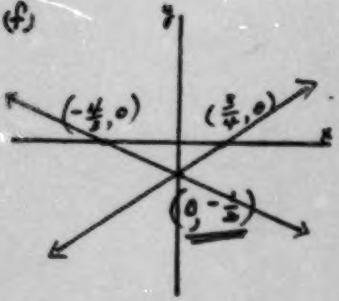
(d)


y
(0,5)
(-3,2)
(-5,0)
x
(0,-1/2)

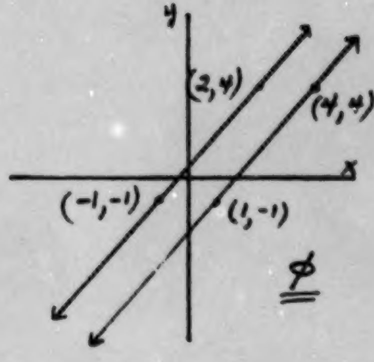
(e)


y
(0, 7/4)
(-7,0)
x
(0, -21/5)

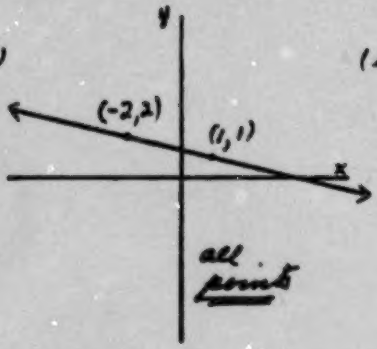
(f)


y
(-4/3, 0)
(3/4, 0)
x
(0, -1/2)

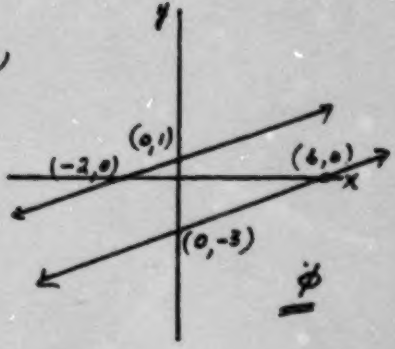
(g)


y
(2,4)
(4,4)
x
(-1,-1)
(1,-1)
φ

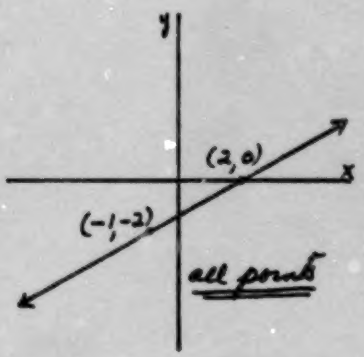
(h)


y
(-2,2)
(1,1)
x
all points

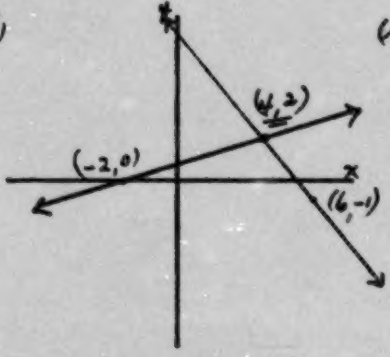
(i)


y
(0,1)
(-2,0)
(6,0)
x
(0,-3)
φ

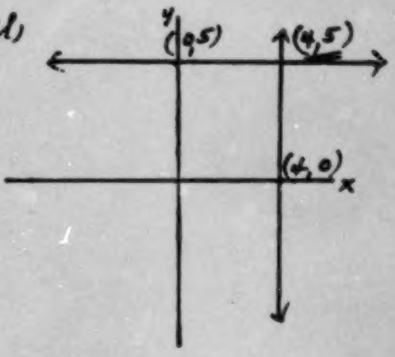
(j)


y
(2,0)
x
(-1,-2)
all points

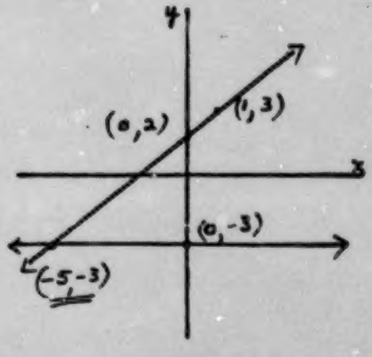
(k)



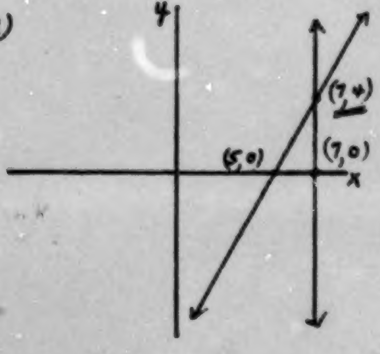
(l)



(m)


y
(0,2)
(1,3)
x
(0,-3)
(-5,-3)

(n)



3-d.
a) (2,3)
b) (1,-3)
c) (2-,-2)
d) (1,0)
e) (10,-5)
f) (0,0)
g) (1/2, 1/3)
h) (1/4, 1/7)
i) (2/3, 1/4)
j) (12,10)
k) (-3,4)
l) (4,0)
m) (4,14)
n) (6,8)
o) (-3,2)
p) (4,5)
q) (4,-6)
r) (7,3)
s) (5,10)
t) (90,100)
u) (24,36)
v) (15,-7)

4.
a) 18,10
b) 159,91
c) 8,30
d) 28,4
e) $900,$300
f) a=162,s=178
g) p=234,n=58
h) o=165,f=192
i) 85,70
j) $6.80
k) $\sqrt{136}$ (11.66)
l) 6.67 kg of $6.00 candy, 13.33 kg. of $3.75 candy
m) 16 - 60¢, 24 - 30¢
n) 53

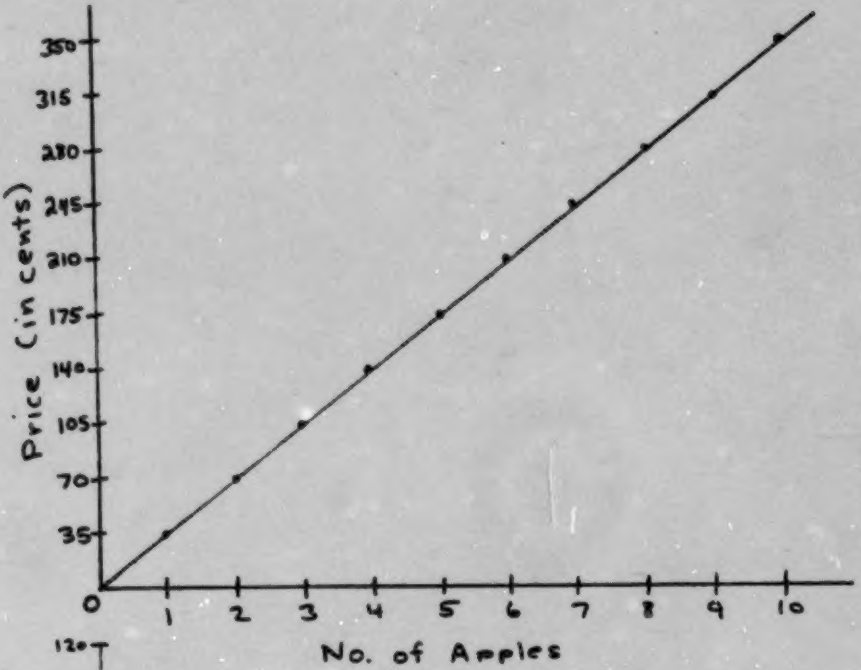
C. GRAPHING

Note: The slope of the graphs will be affected by the scale selected.

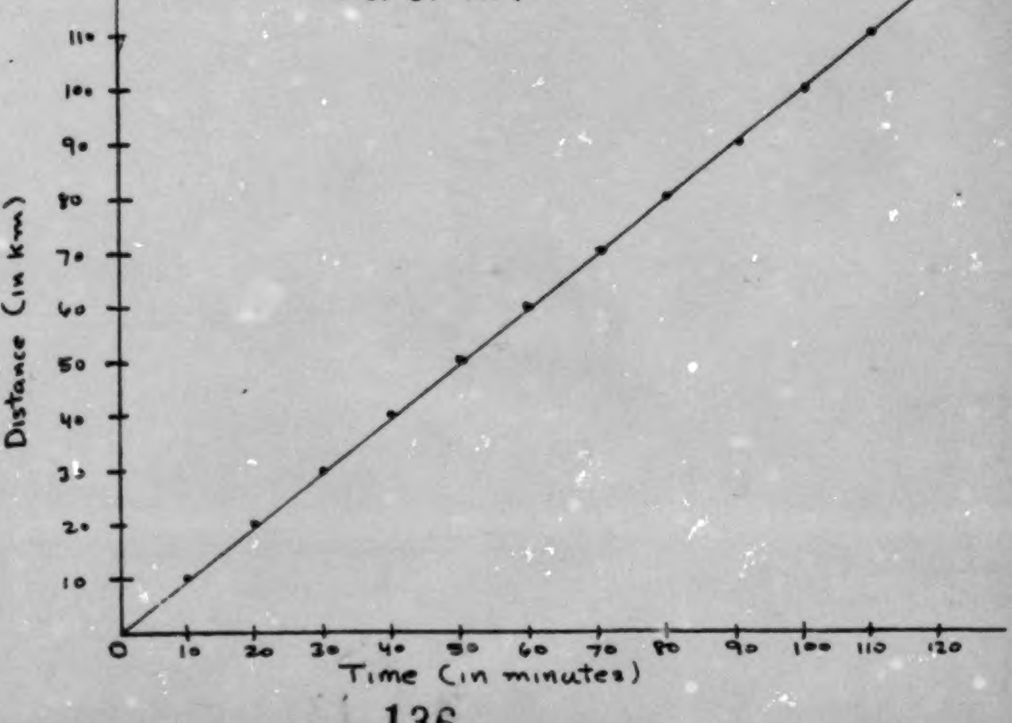
1. 1-3 Answers will vary according to the data collected.

2. 1. Answers will vary.

2. a)



b)



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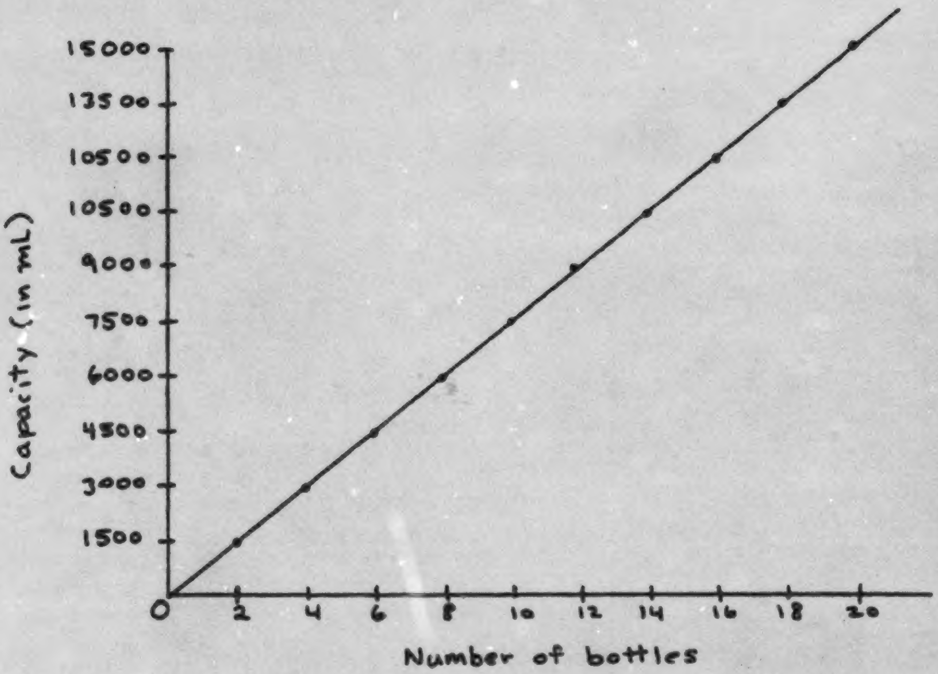
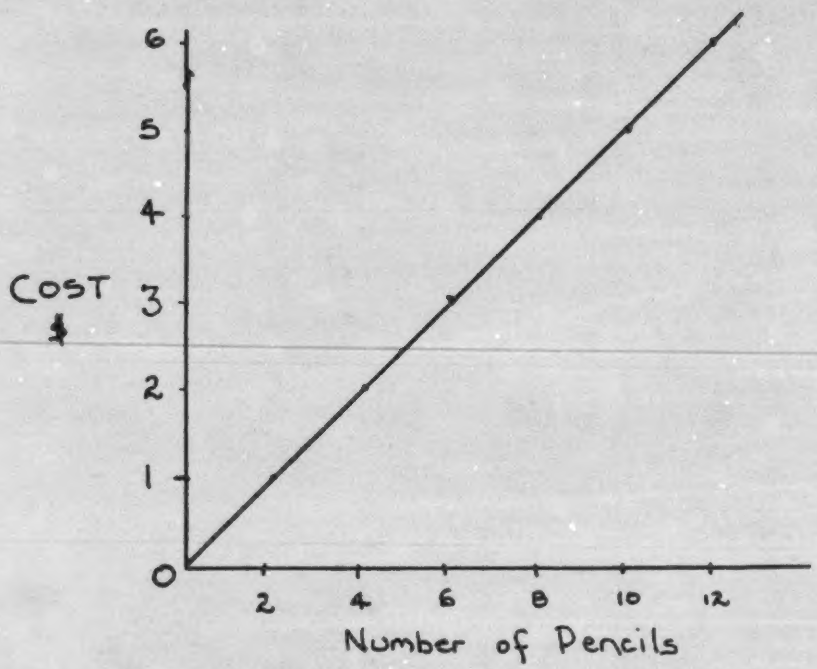
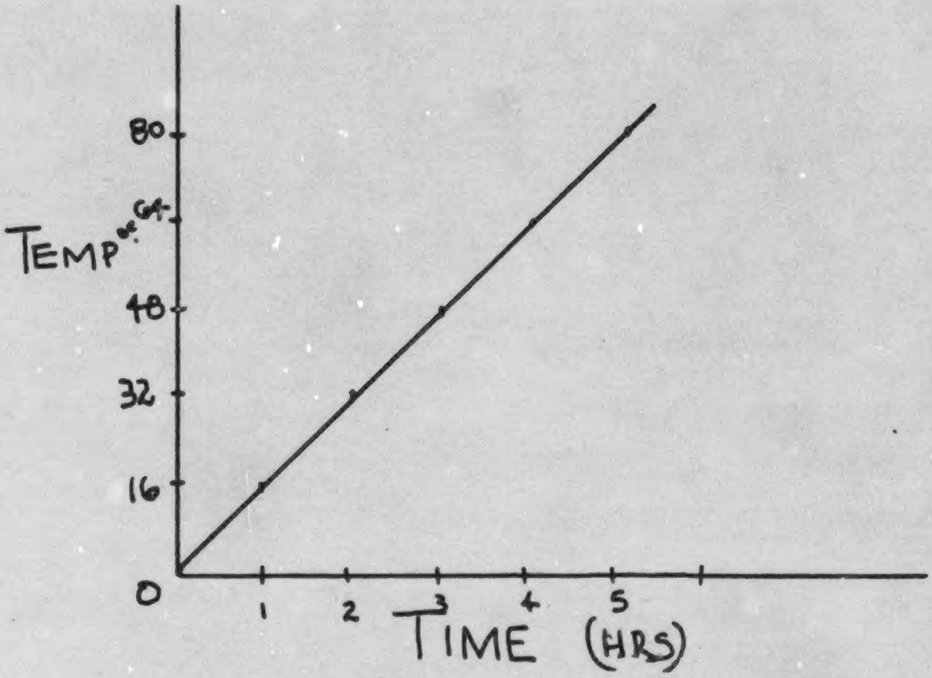
c)


15000
13500
10500
10500
9000
7500
6000
4500
3000
1500
0
Capacity (in mL)
2
4
6
8
10
12
14
16
18
20
Number of bottles

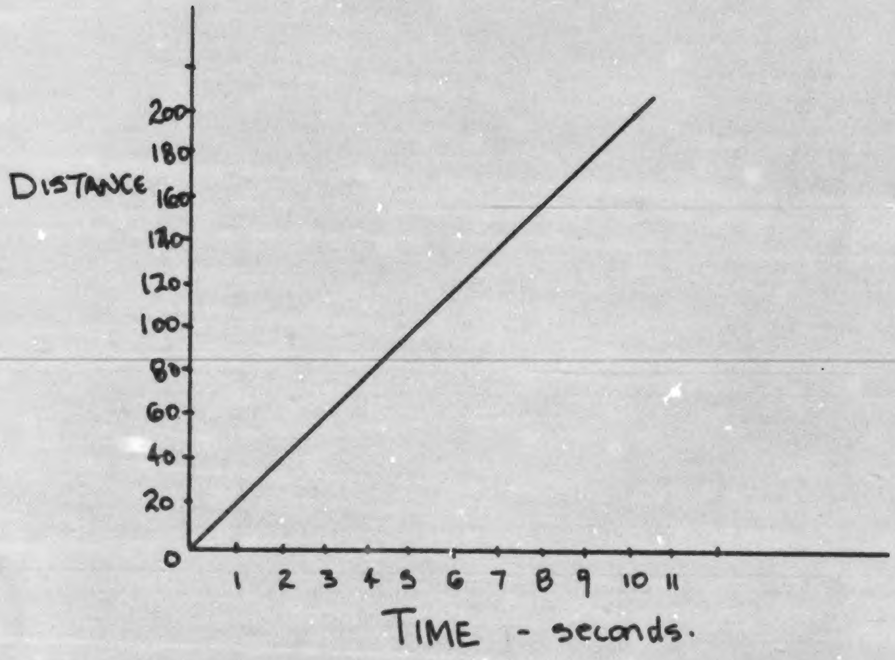
3. a)


6
5
4
3
2
1
0
COST
$
2
4
6
8
10
12
Number of Pencils

b)


80
64
48
32
16
0
TEMP °F
1
2
3
4
5
TIME (HRS)

c)


200
180
DISTANCE
160
140
120
100
80
60
40
20
0
1
2
3
4
5
6
7
8
9
10
11
TIME - seconds.

4.

1. a) 15 km
   b) 93 km
   c) 150 km

2. a) 5250 ml
   b) 11 250 ml
   c) 18 000 ml
   d) 15 750 ml

3. a) 12°C
   b) 36°C
   c) 88°C

4. a) 150 m
   b) 220 m

5. a) $10
   b) $17.49
   c) $11.66 A good estimate is between $11 and $12.
   d) $33.32 A good estimate is $32 to $35.
   e) $59.98

5.

1. W = N x M where W = total on pan
   N = number of marbles
   M = mass of 1 marble

   H = N x T where H = height of pile
   N = number of texts
   T = height of 1 text (thickness)

2. a) C = N x A where C = total cost
   N = number of apples
   A = cost of 1 apple

   b) D = V x T where D = distance travelled
   V = velocity (uniform)
   T = time

   c) V = N x C where V = total volume
   N = number of bottles
   C = capacity of 1 bottle

3. a) C = N x P where C = total cost
   or C = N50
   N = number of pencils
   P = price of 1 pencil (50¢)

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b) T = C x I where T = temperature
or T = 8·I C = temperature increase of I interval
I = number of intervals

c) D = V x T where D = distance travelled
or D = 20·T V = velocity of object
T = time (seconds)

4. C = N x P where C = total cost
or C = N·16 N = number of footballs
or C = 16N P = price of I ball

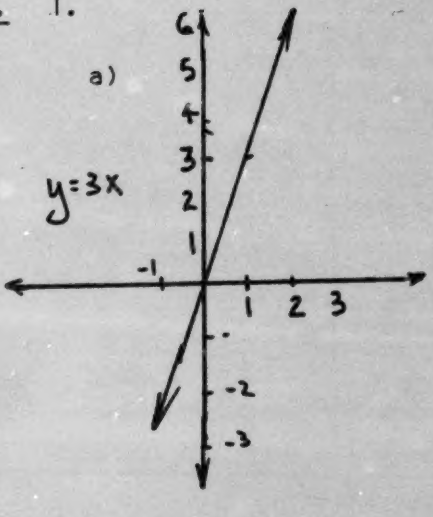
5. D = V x T where D = distance in kilometres
or D = 2 x T V = velocity - constant
or D = 2T T = time - minutes

6. M = N x W where M = total mass
or M = N x .5 N = number of boxes
or M = .5N W = mass of I box - constant

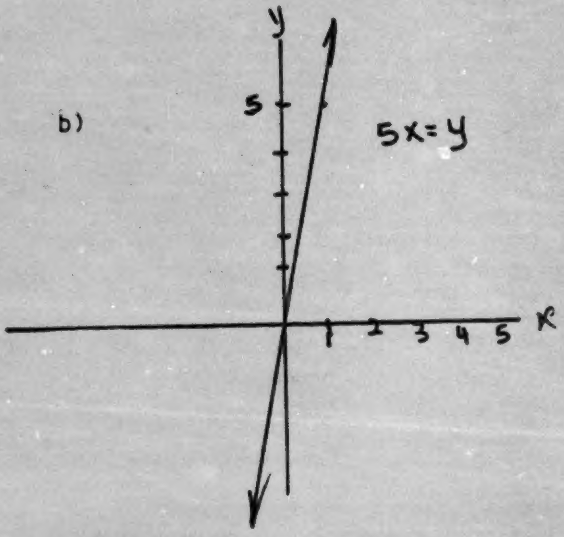
Note: For answers for 5, students need not have the same letters, but should indicate what their chosen letters represent.

6. 1.

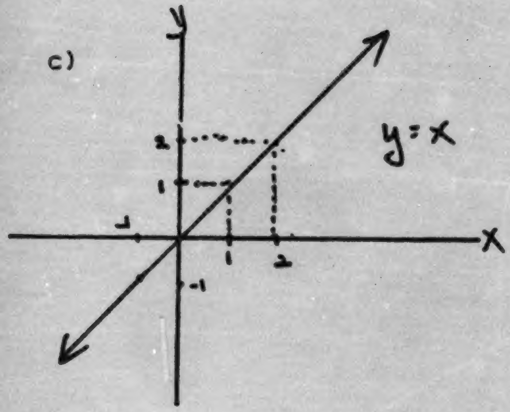
a)



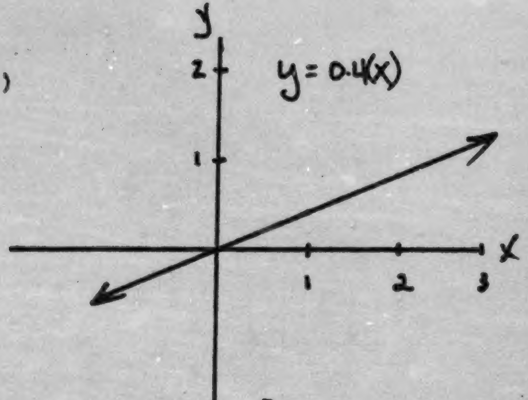
b)



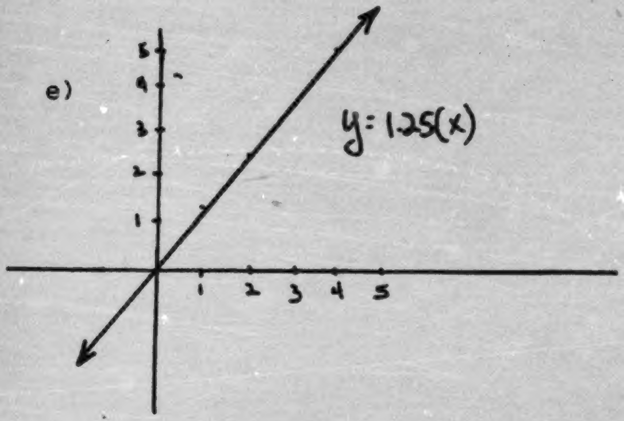
c)


y
x
$y = x$
2
1
1
2
-1

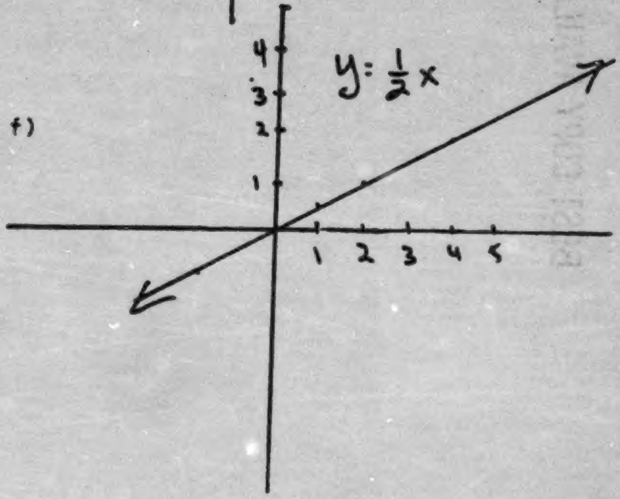
d)


y
x
$y = 0.4(x)$
2
1
1
2
3

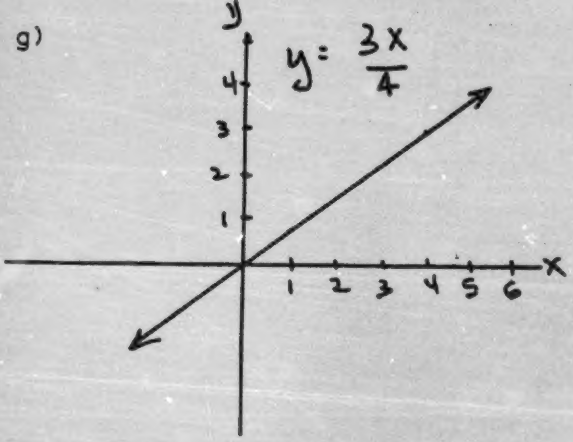
e)


$y = 1.25(x)$
5
4
3
2
1
1
2
3
4
5

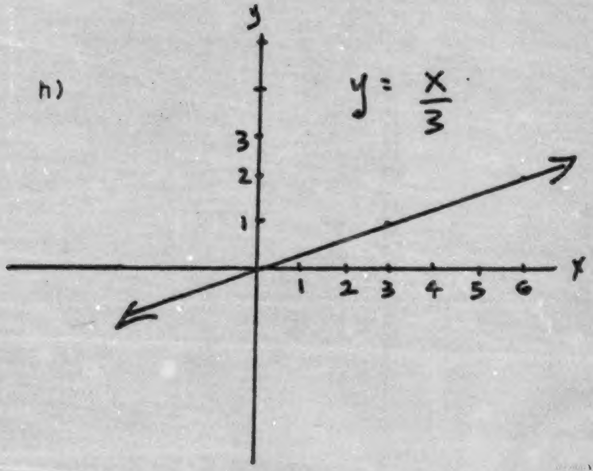
f)


$y = \frac{1}{2}x$
4
3
2
1
1
2
3
4
5

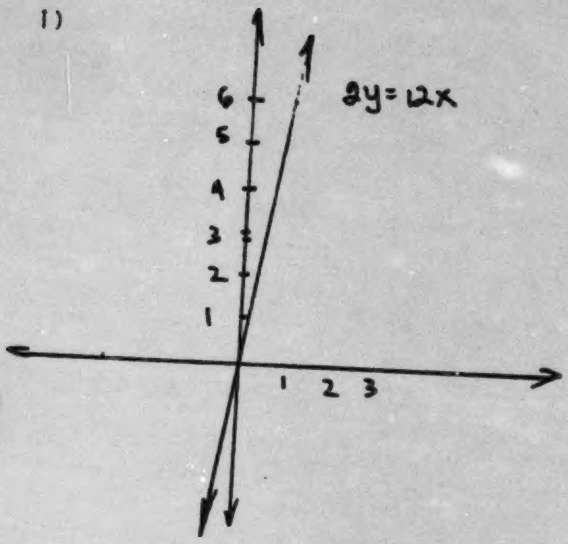
g)


y
x
$y = \frac{3x}{4}$
4
3
2
1
1
2
3
4
5
6

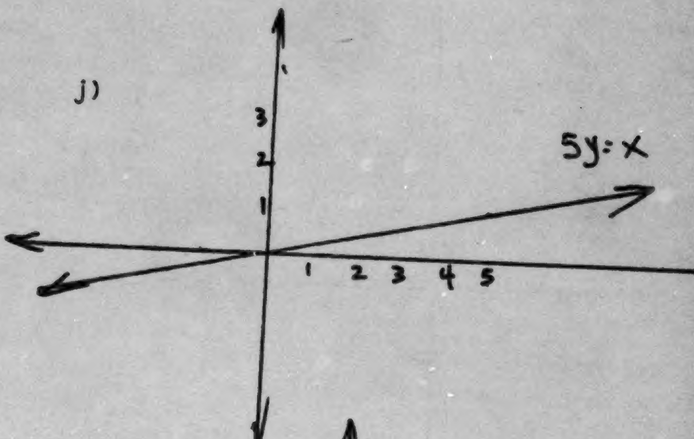
h)


y
x
$y = \frac{x}{3}$
3
2
1
1
2
3
4
5
6

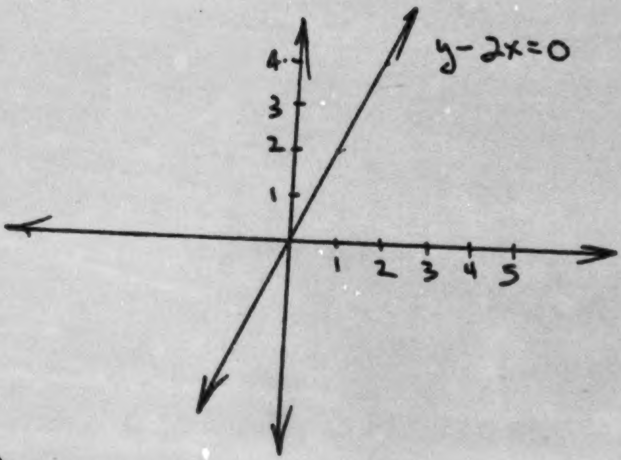
i)



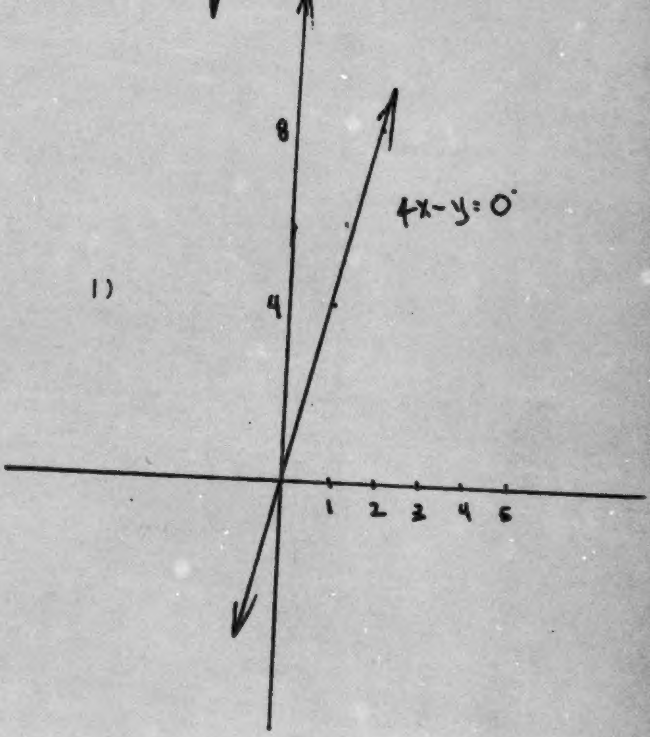
j)



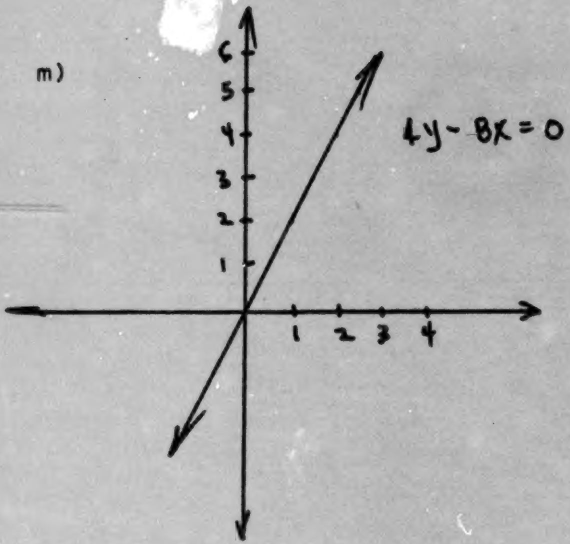
k)



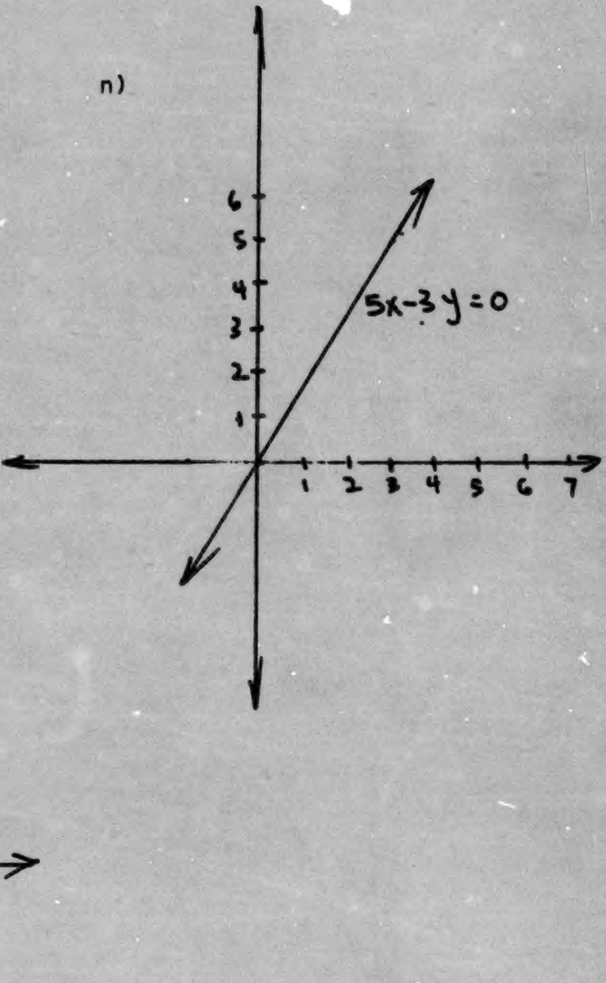
l)



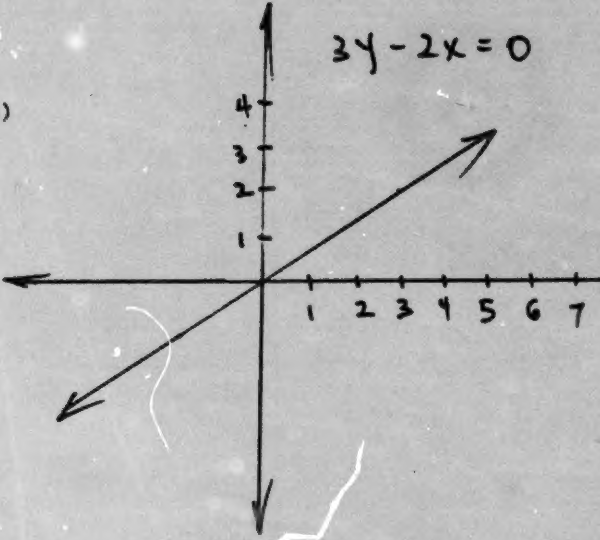
m)



n)

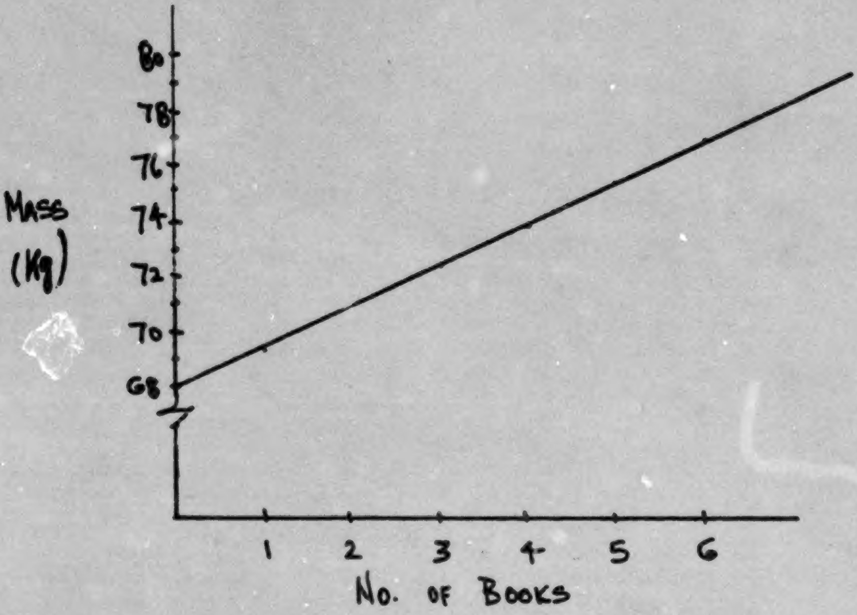


o)

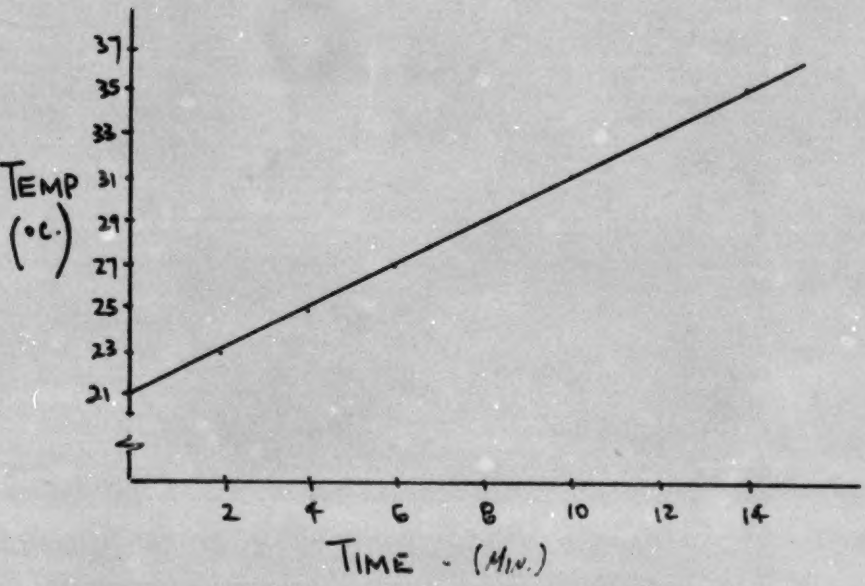


Partial Linear Relations

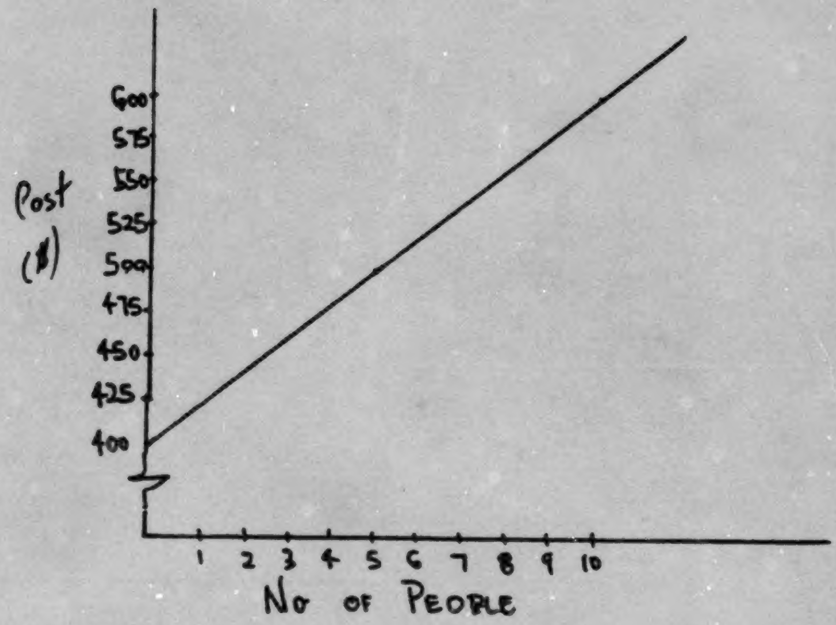
a)



b)



c)



4. a) i) 1.5 kg
ii) 86 kg

b) i) $26^{\circ}C$
ii) $30.5^{\circ}C$
iii) $41^{\circ}C$
iv) $1^{\circ}C$

c) i) \$640
ii) \$70
iii) \$86.67

5. a) $W = 68 + n(1.5)$ or $W = 1.5N + 68$ where W is weight in kg and n is the number of books; $c = 400 + n(20)$.

b) $C = 45 + n(2.95)$. Estimate, about \$22.10.

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6. 1. a) i. $4y = 3x - 10$
$y = 3x - 10/4$
$y = 3/4x - 10/4$ or $y = 0.75X = 2.5$

ii. $2y + 4x = 8$
$2y = -4x + 8$
$y = 2x + 4$

iii. $6x - y = 3$
$-y = -6x + 3$
$y = 6x - 3$

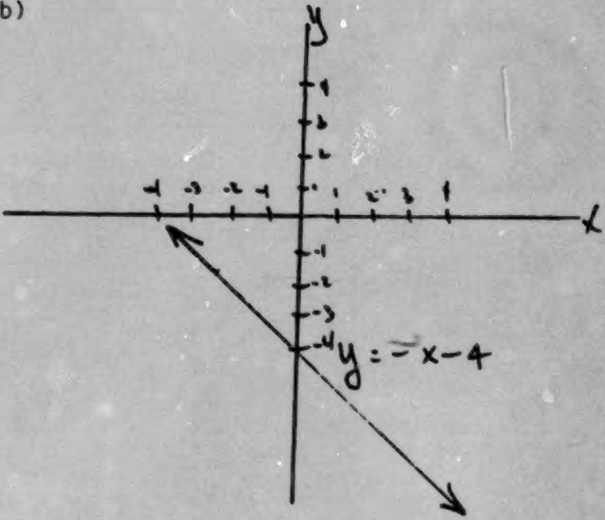
iv. $8x + 2y + 2 = 0$
$2y = -8x - 2$
$y = -4x - 1$

b) $y = \frac{2}{3}x - 1$

2. $y = 4x + 2$

3. a) $y = -x + 4$
$y = -x$

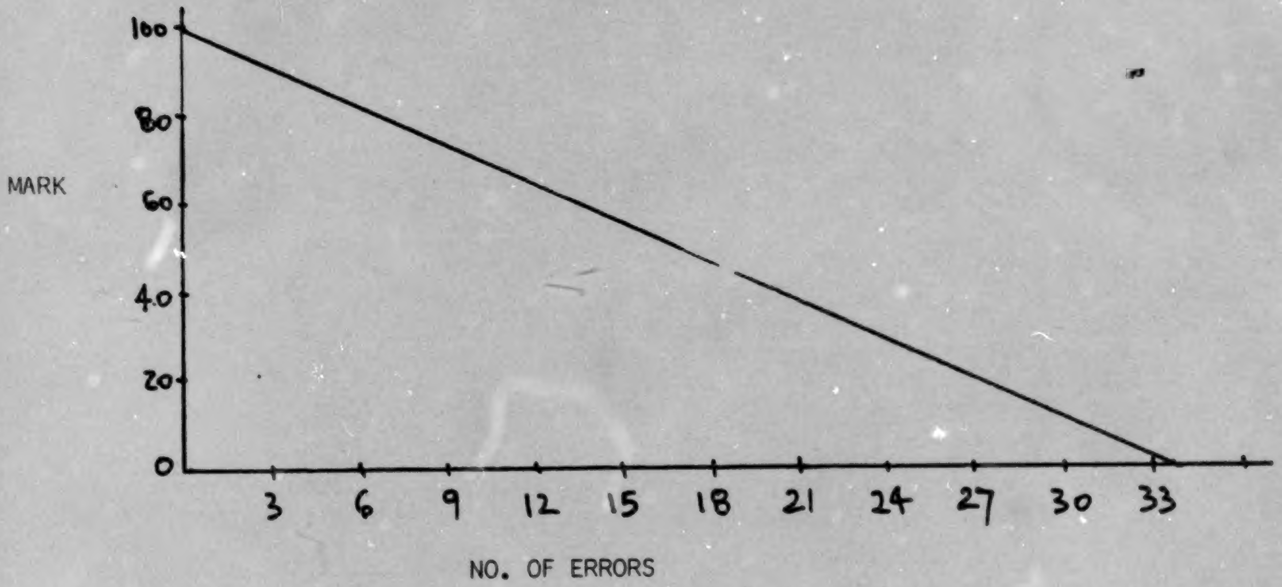
b)



c) The lines are parallel.

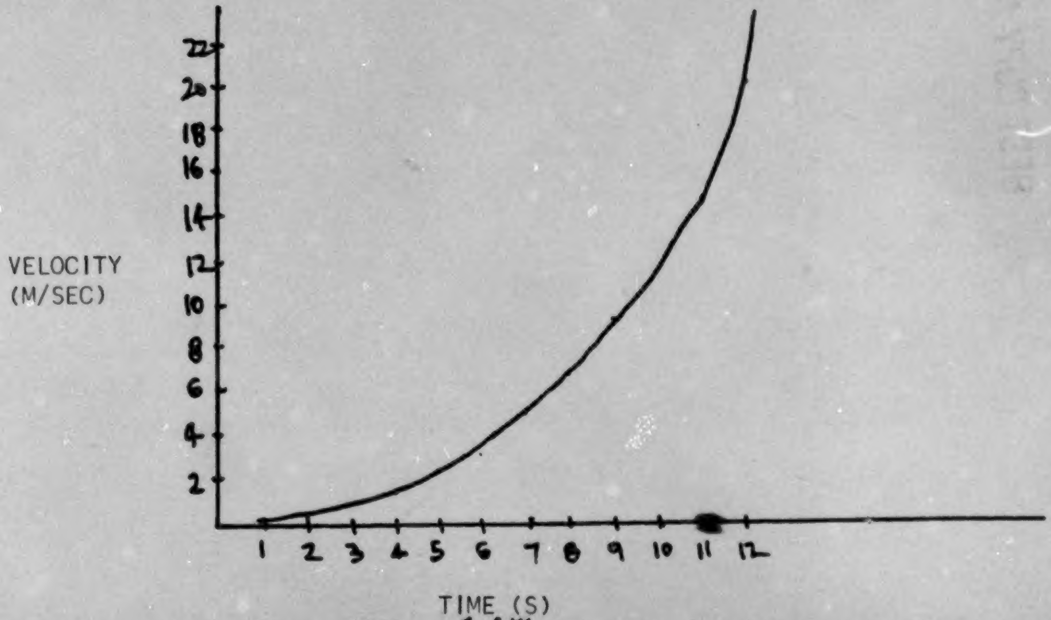
7. 1. a) $y = -2x - 5$
b) $y = \frac{4}{3}x - 3$
c) $y = \frac{9}{4}x + 4$
d) $y = \frac{-5}{2}x + 17$

2. a) $C = 12(n) + 100$
   b) $C = .08(km) + 28$ - for 650 km, cost is $.08(650) + 28 = \$80$
   - for 1000 km, cost is $.08(1000) + 28 = \$108$
   c) Equation is: Mark = -3 (# of errors) + 100
   $M = -3(E) + 100$
   Minimum errors for failure: $49 = -3(E) + 100$
   $-51 = -3(E)$
   $E = 17$

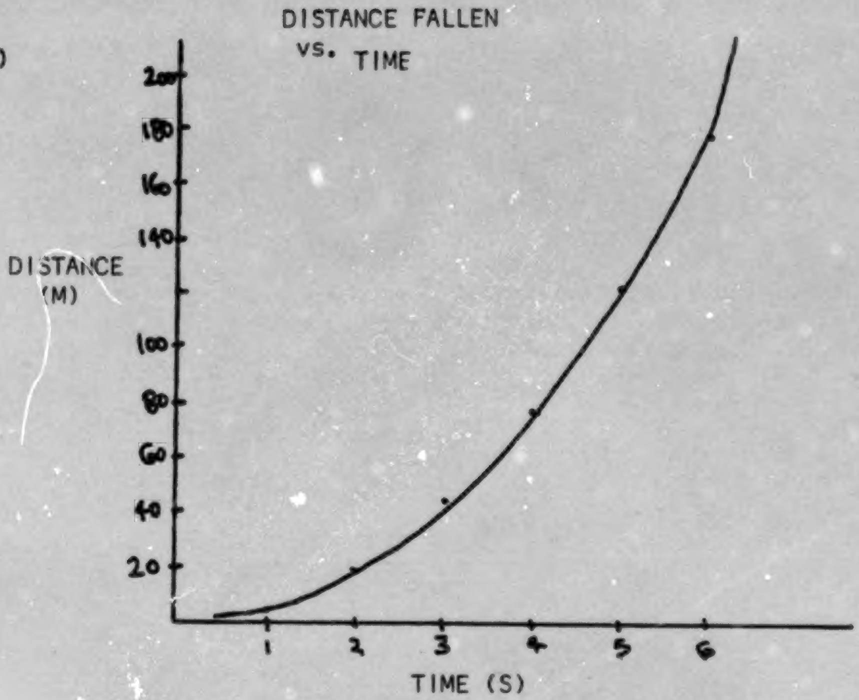


Non-Linear Relations

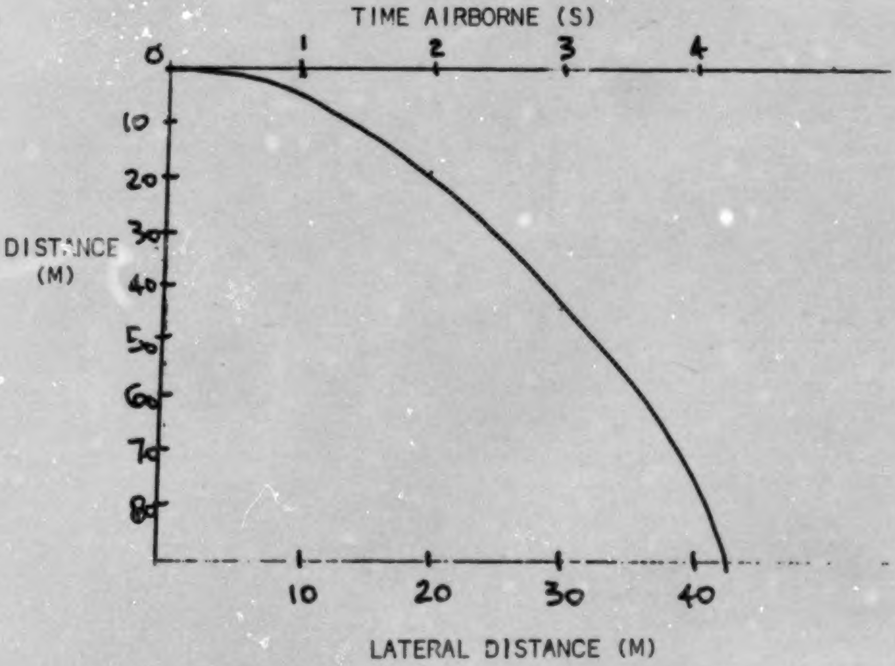
1. a)



b)



c)



Note: This form of graph (c) is more acceptable than (b) as it visually portrays the actual path of the object.

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2. a) 11.2 seconds, 13 seconds (A good estimate is acceptable.)
   b) (Estimate: 240-250 m), 400-500 m
   c) 80 m

D. VARIATION

Direct Variation

1. A direct variation is a relationship such as $Y = kX^n$ where k and n are greater than zero. The following are examples of direct variation: 1, 2, 3, 5, 7, 9, 10, 11, 13, 41, 15, 17 (6, 8, 12, and 16 are not).

2.

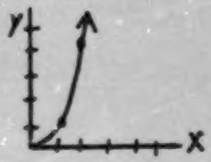
1. 6.25
2. $40
3. $12
4. 4
5. 2.5
6. a
7. 5
8. $4.50
9. 1/2
10. $3.00

3.

1. 20 L
2. 6 minutes
3. y = 15
4. a = 50
5. 4.44 g
6. 125 m
7. 1.6 sec.

4.

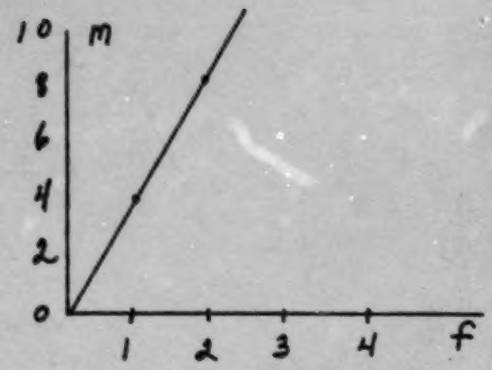
1. y varies directly as the square of x



x	y
0	0
1	1.5
2	6
3	13.5

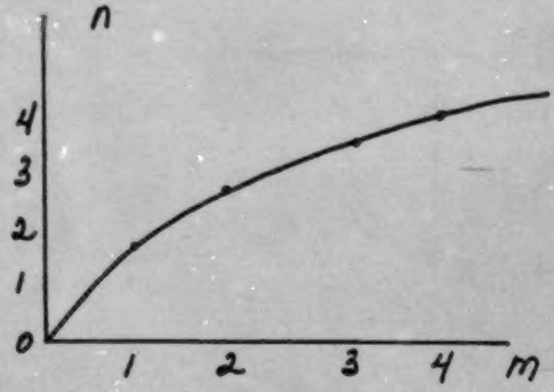
2. $m = 4f$
m varies directly with f

f	m
0	0
1	4
2	8
3	12



3. If n varies directly with the square root of m, then $n = k\sqrt{m}$
(Note: for the purpose of showing the graph and table of values, $k = 2$ is chosen).

m	n
0	0
1	2
2	$2\sqrt{2}$
3	$2\sqrt{3}$
4	4



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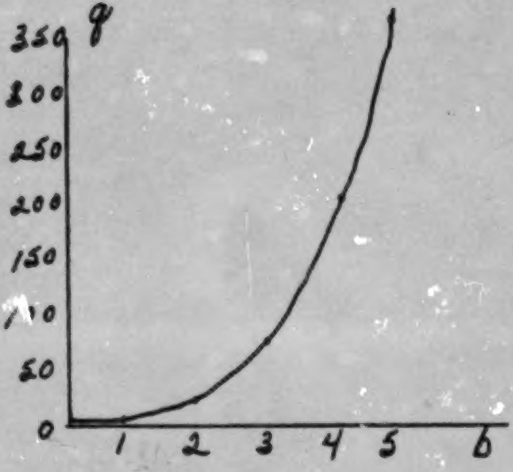
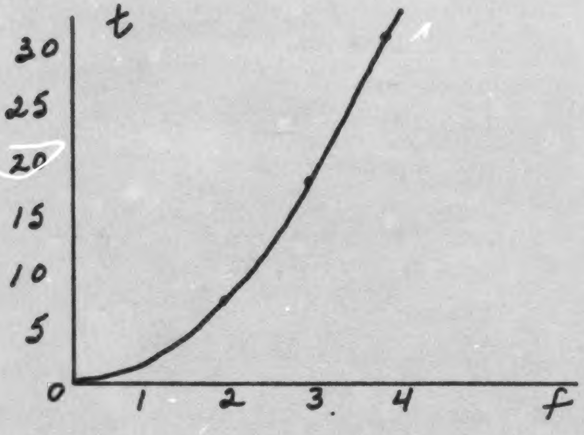
$q = kb^3$ ($k = 3$ is chosen to show the chart and graph)

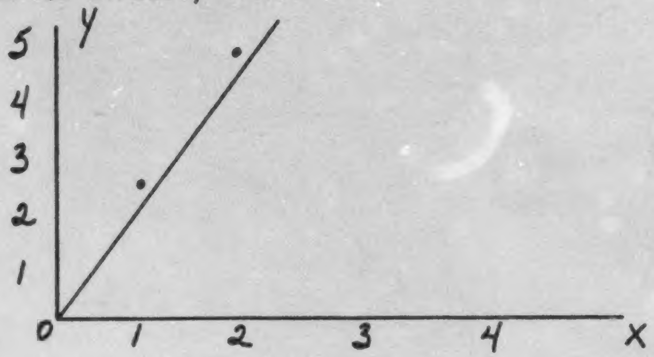
b	q
0	0
1	3
2	24
3	81
4	192
5	375



5. $t = 2f^2$
t varies directly with the square of f



6. $y = 2.5x$
y varies directly with x



7. The total bill varies directly with the number of baseballs purchased; $C_t = 5B$

B	C_t
2	10
4	20
6	30
8	40
10	50

8. The height varies directly with the number of books; $h = 1.5b$

b	h
1	1.5
2	3
3	4.5
4	6
5	7.5

Partial Variation

1. 1. - 14. The following are examples of partial variation: 1, 3, 4, 6, 7, 8, 10, 11, 12, 14

2,3. 1. $C_t = \$200 + \$10n$; (k= 10)
$C_{25} = 200 + 250 = \$450$

2. $W_t = 500 \times 2000$; k = 500 kg
$W_{11} = 5500 + 2000 = 7500$ kg

3. $y = 3x + 6$; $k = 3$; $y_{14} = 48$

4. $d = 20 + 2g^2$; $k = 2$
$d_2 = 20 + 2(4) = 28$

5. $C_t = \$45 + \$2.25n$; k = \$2.25
C29 = 45 + 2.25 (29) = \$110.25

6. $C_t = \$1000 + \$110n$; k = \$110
a) $C_{270} = 1000 + 110(270) = \$30\ 700$
b) x = 300 hectares

7. $C_t = \$200 + \#20n$; k = \$20
a) $C_{38} = 200 + 20(38) = \$960$
b) n = 43 hogs

Inverse Variation

The following are examples of inverse variation:
1. 1, 2, 5, 6, 7, 8 (b = 1200/a), 9, 10

2,3. 1. k = 560; $t_{100} = 5.6$h
2. k = 300; d = 15; m = 10
3. Since V = k/R and V = IR then V = 6
k = 6R = 18; R = 1
4. k = 1200; m = \$8
5. k = 720; t = 20d
6. k = 225; m = 15
7. $k = 1.27 \times 10^7$; B = 3.763 mm

Mixed Variation

1. 1. Direct; 9 blows; k - 3
2. Inverse; $k = 2.7 \times 10^4$; n = 216
3. Partial; k = 70¢; $C_{150} = \$155.00$
4. Direct; \$1273.89
5. Inverse; $k = 2.56 \times 10^4$; $A = 1.024 \times 10^5$ or 102.4 k
6. Partial; k = 56 1/4¢; $C_5 = \$3.81$

2. 1. Partial
2. Direct; $y = 1/2\ x^2$
3. Direct
4. Inverse
5. Inverse
6. Partial

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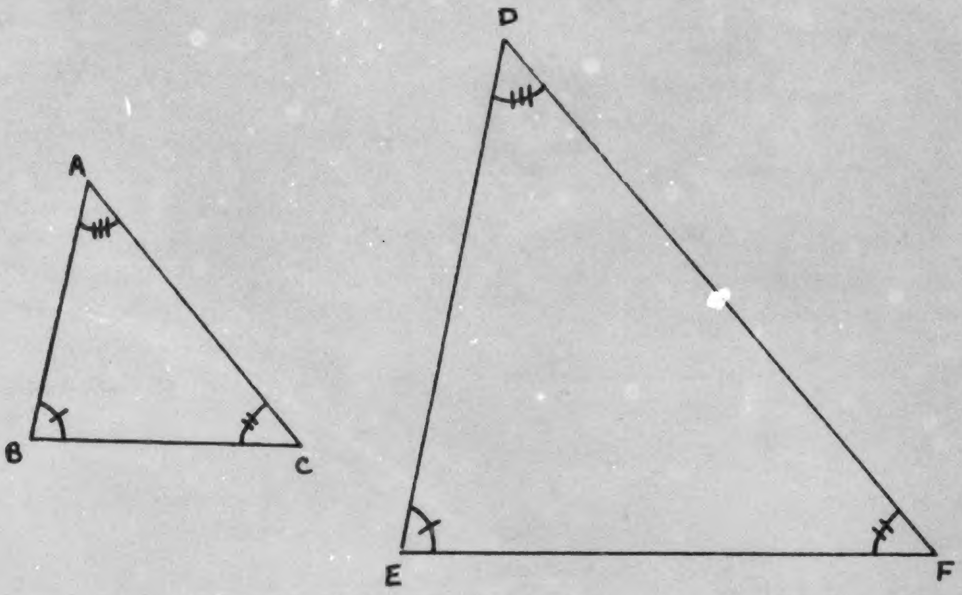
C.III. TRIGONOMETRY (I MODULE)

Note: Express all trigonometric ratios correct to five decimal places.

1,2. 1. For each of the pairs of similar triangles, identify the corresponding parts.

a)



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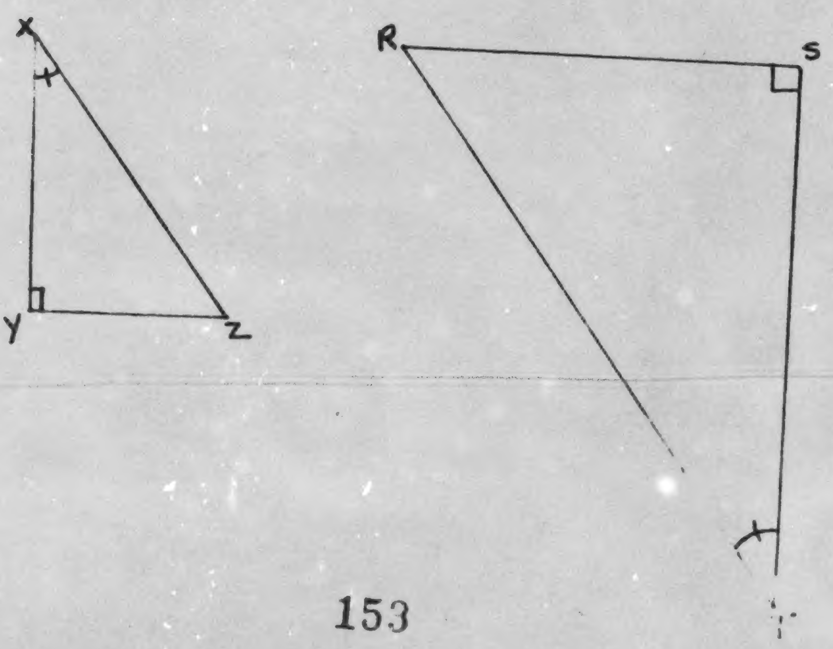
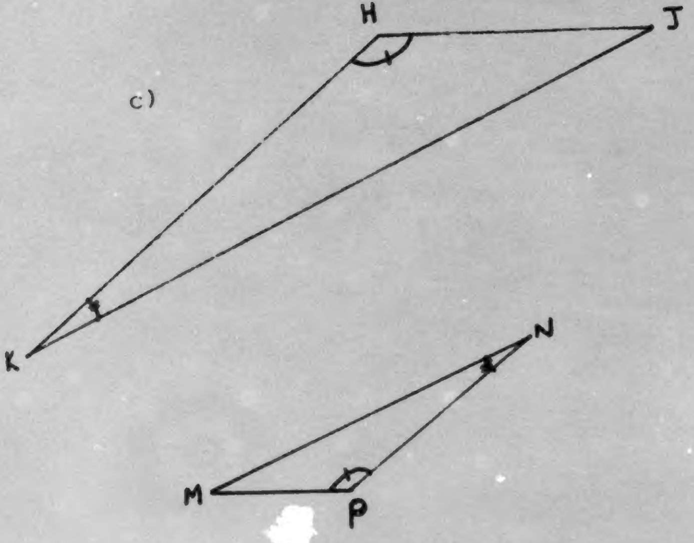
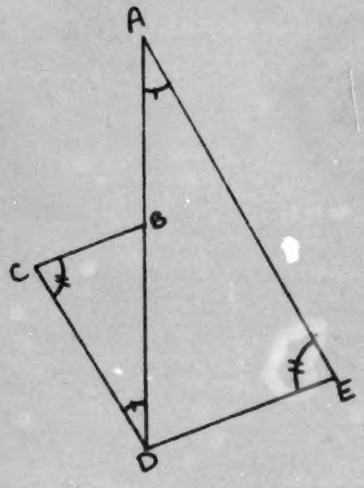
b)



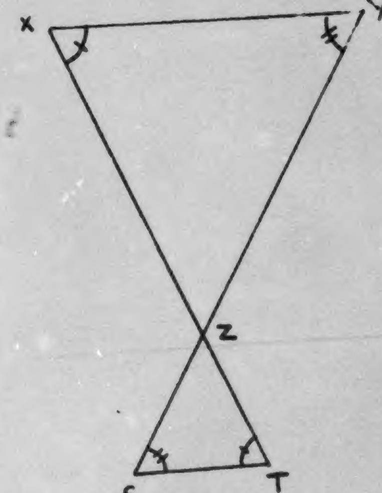
c)

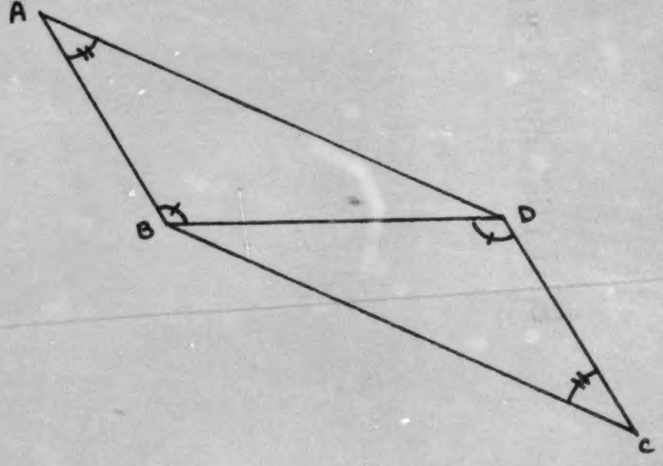


d)

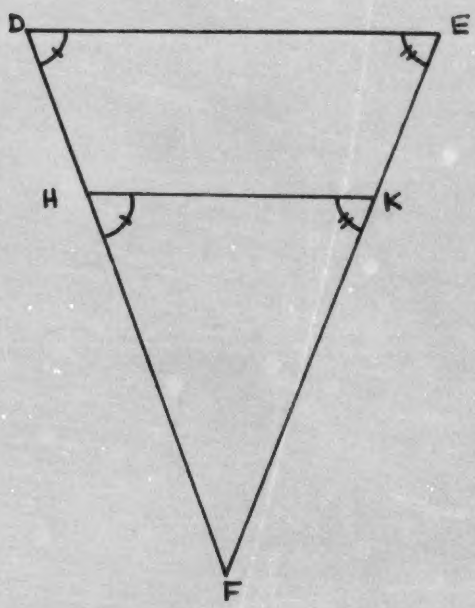


e)

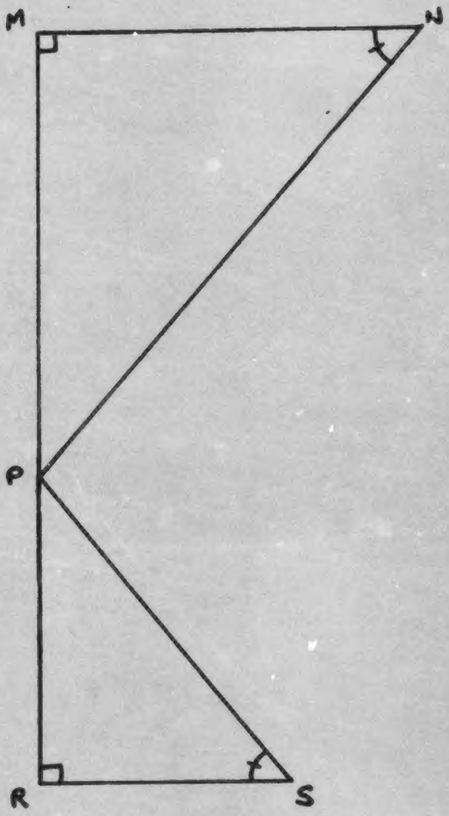




g)

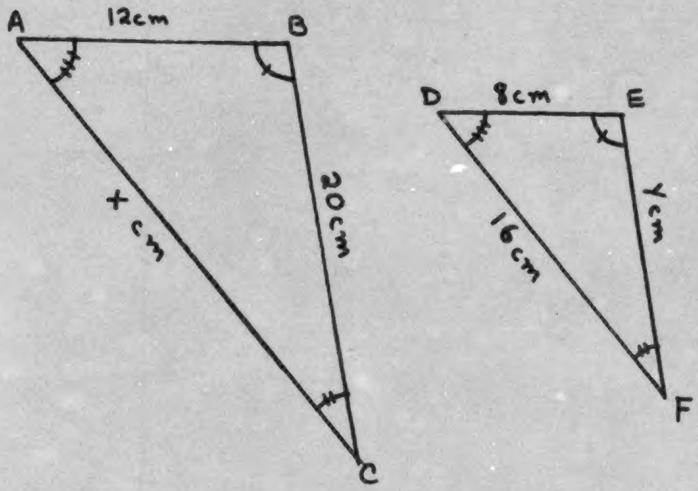


h)

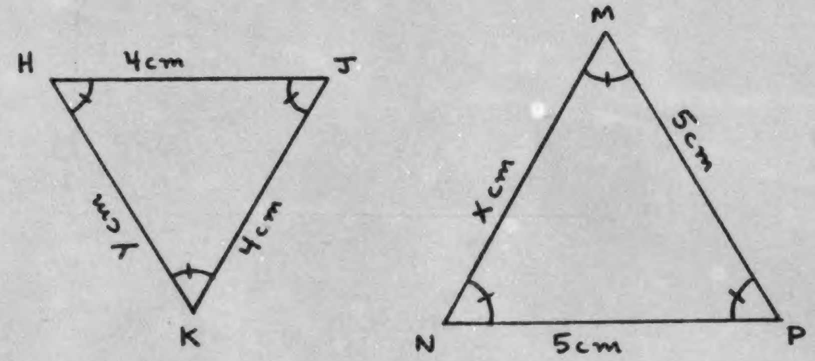


3. 1. For each of the pairs of similar triangles, solve for x and y, using equivalent ratios.

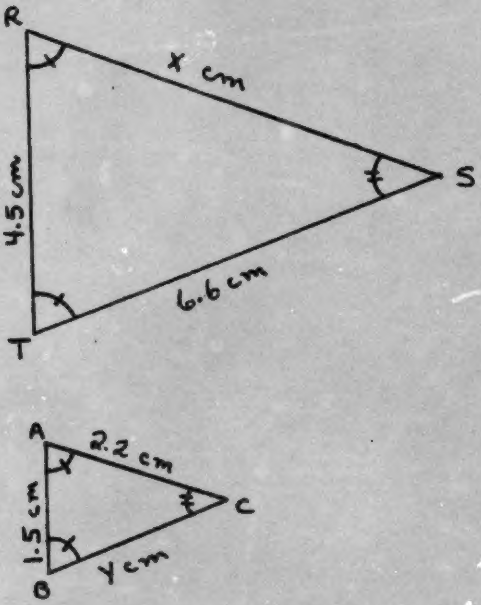
a)


A
12cm
B
x cm
20cm
C
D
8cm
E
16cm
y cm
F

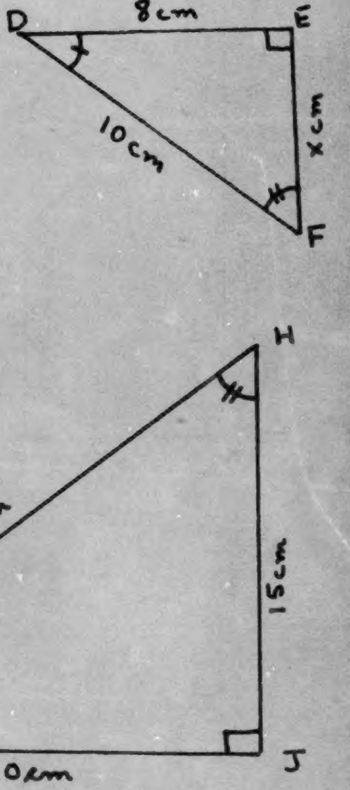
b)


H
4cm
J
y cm
4cm
K
M
x cm
5cm
N
5cm
P

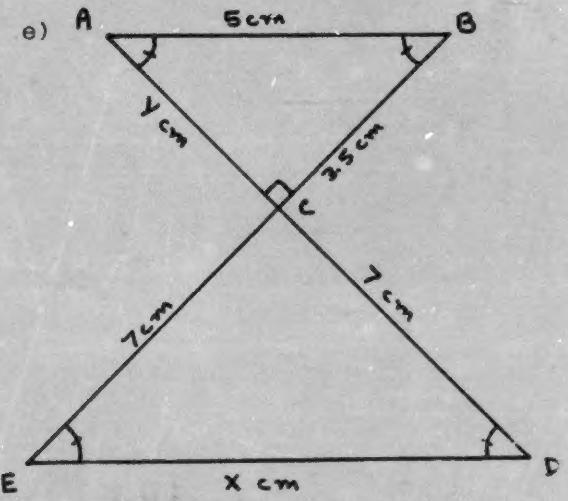
c)

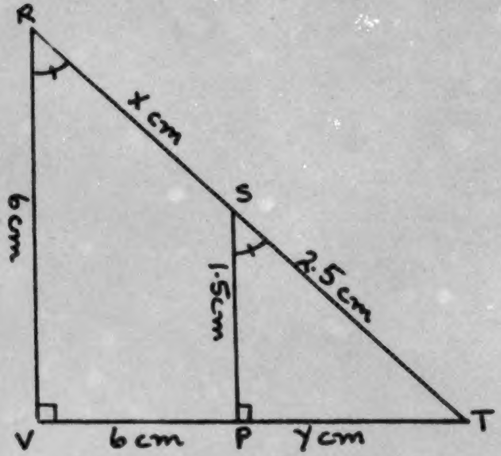

R
x cm
S
4.5 cm
6.6 cm
T
A
2.2 cm
C
1.5 cm
y cm
B

d)

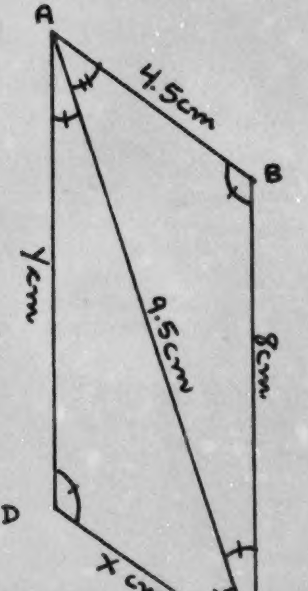

D
8 cm
E
10 cm
x cm
F
H
y cm
15 cm
K
20 cm
J

e)

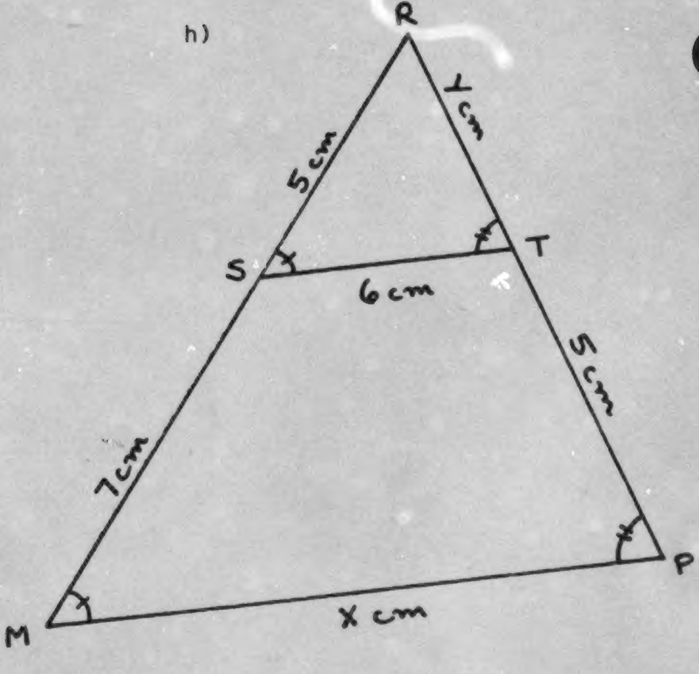

A
5 cm
B
y cm
3.5 cm
C
7 cm
7 cm
E
x cm
D


R
x cm
S
6cm
1.5cm
2.5cm
V
6 cm
P
Y cm
T

g)


A
4.5cm
B
Y cm
9.5cm
8cm
D
x cm
C

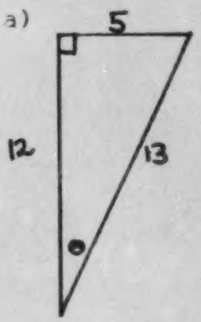
h)


R
5 cm
Y cm
S
T
6 cm
5 cm
7cm
M
X cm
P

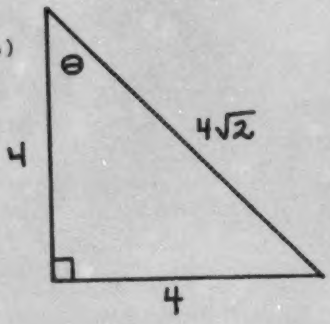
4. 1. Copy the table below. Use the following diagrams to complete the table.

	Hypotenuse	Side Opposite to θ	Side Adjacent to θ	Sin θ	Cos θ	Tan θ
a)						
b)						
c)						
d)						
e)						

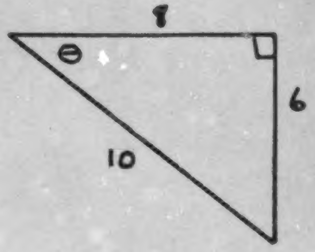
a)



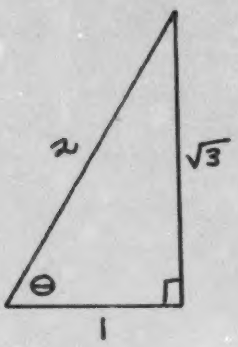
b)



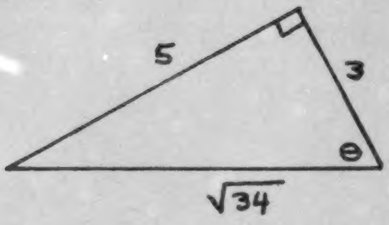
c)



d)



e)



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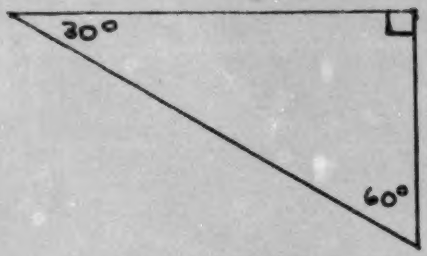
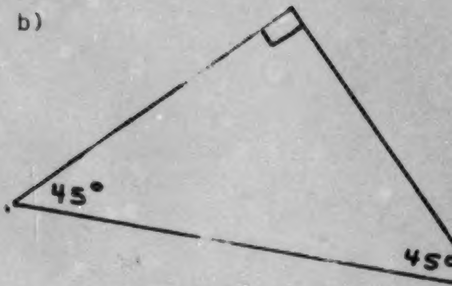
2.

a)



b)



i) Find the length of each side of the above triangles (by measuring), and write them on the diagram.

ii) Using the above information, complete the following table. (Write answers as decimals.)

Sin 60° =	Sin 30° =	Sin 45° =
Cos 60° =	Cos 30° =	Cos 45° =
Tan 60° =	Tan 30° =	Tan 45° =

5. 1. Use a calculator to find the numerical value of each of the following:

a) Sin 60° =
b) Cos 60° =
c) Tan 60° =
d) Sin 30° =
e) Cos 30° =
f) Tan 30° =
g) Sin 45° =
h) Cos 45° =
i) Tan 45° =

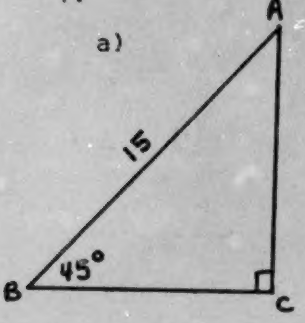
Note: These answers should compare with the answers from the preceding table.

2. Use a calculator to find the numerical value of each of the following:

a) Sin 10° =
b) Cos 23° =
c) Tan 47° =
d) Sin 81° =
e) Cos 16° =
f) Tan 59° =
g) Sin 50° =
h) Cos 72° =
i) Tan 2° =
j) Sin 63° =
k) Cos 89° =
l) Tan 31° =

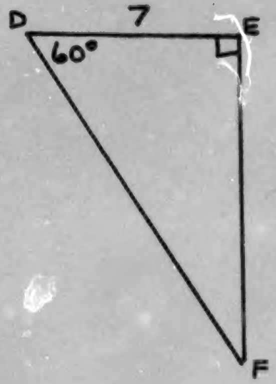
6. 1.

a)



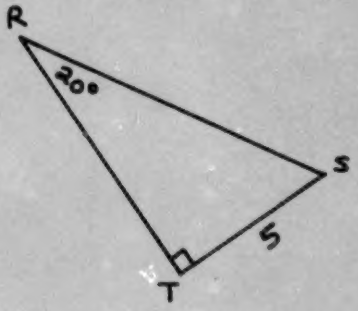
Find ∠A,b

b)



Find ∠F,e

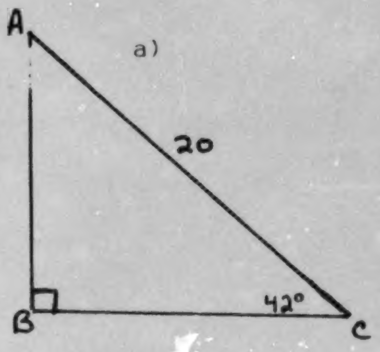
c)

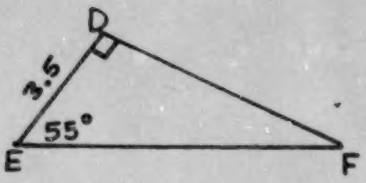


Find t,s

2. Solve the following triangles.

a)





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c) ΔABC, where $\angle A = 90^\circ$, $\angle C = 39^\circ$, $c = 18$

d) ΔDEF, where $\angle E = 90^\circ$, $\angle D = 15^\circ$, $e = 16.2$

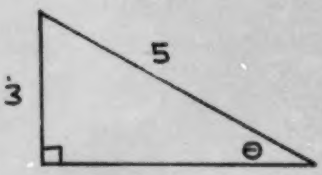
3. From a point A, 27 m from the base of a flag pole, the angle of elevation of the top of the pole is 57°. What is the height of the pole?

4. From the roof of a building, the angle of depression of a car parked on the street is 65°. The building is 45 m high. If the base of the building is in the same plane as the street, how far from the base of the building is the car?

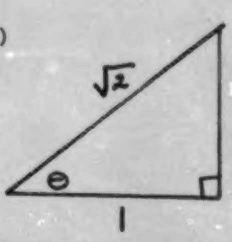
5. A ramp is inclined at an angle of 20° to the horizontal. A man walks down the ramp a distance of 40 m. How many metres below his starting point is the man?

7. 1. Determine θ in the following right triangles.

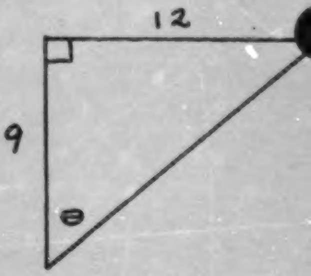
a)



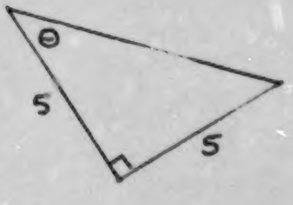
b)



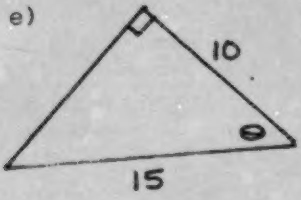
c)



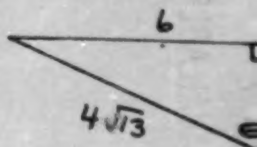
d)



e)



f)

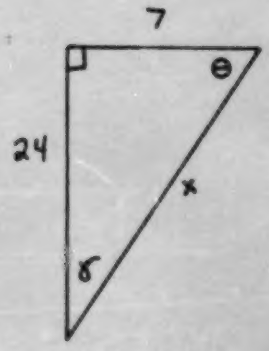


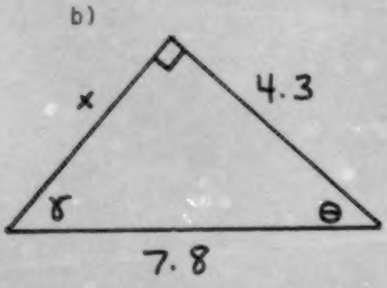
2. Determine the value of θ $(0 \leq \theta \leq 90)$ given the following:

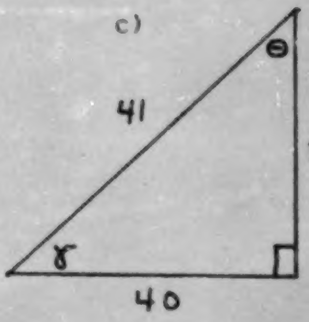
a) $\sin\theta = .25882$
b) $\cos\theta = .30902$
c) $\tan\theta = 1.42815$
d) $\sin\theta = .58779$
e) $\cos\theta = .88295$
f) $\tan\theta = 1.00000$
g) $\sin\theta = .87462$
h) $\cos\theta = .99863$
i) $\tan\theta = 28.63625$

8.

1. Determine x, θ, and γ for the following right triangles.







2. Solve the following right triangles.

a) ΔABC, $\angle A = 90^{\circ}$, $a = 9.7$, $b = 6.5$

b) ΔDEF, $\angle F = 90^{\circ}$, $d = 14$, $e = 10$

c) ΔRST, $\angle S = 90^{\circ}$, $r = 33.67$, $s = 48.25$

3. For a flag pole 32 m in height to cast a shadow 60 m in length, what would the angle of elevation of the sun have to be?

4. A 10 m ladder is placed against a building so that the top of the ladder just reaches the eave on a building. If the distance from the eave to the base of the building is 8.2 m:

a) What angle does the ladder make with the ground?
b) How far is the base of the ladder from the base of the building?

5. Given: rectangle ABCD where AB = 6.5 cm and BC = 7.2 cm, find:

a) the length of diagonal AC;
b) the measure of the angle formed by the diagonal AC and side AB.

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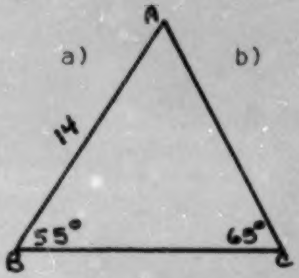
9. 1. Determine the numerical value for the following ($90 \le \theta \le 180$):

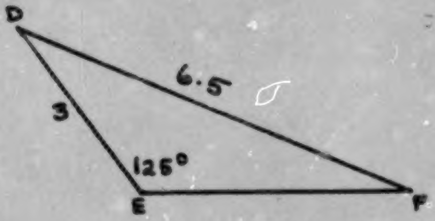
a) Sin 100° =
b) Cos 120° =
c) Tan 150° =
d) Sin 135° =
e) Cos 170° =
f) Tan 95° =
g) Sin 165° =
h) Cos 180° =
i) Tan 117° =
j) Sin 90° =

10. 1. Use the Law of Sines to solve the following triangles:

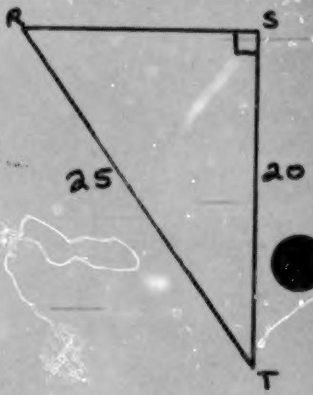
a)



b)



c)



2. Use the Law of Sines for the following:

a) Given ΔXYZ, $\angle X = 40^\circ$, $\angle Y = 70^\circ$, $YZ = 12$, find XY.
b) Given ΔMNP, $\angle N = 90^\circ$, $\angle P = 50^\circ$, $MN = 8$, find MP.
c) Given ΔHJK, $\angle J = 150^\circ$, $HK = 10$, $JK = 5.2$, find $\angle H$.

Law of Sines Problems

1. A straight road runs N.W. from A. From A, the bearing of a television tower is S66°W. From a point B, one kilometre up the road from A, the bearing of the tower is S10°E. Find the distance of the tower from A, to the nearest metre.

2. Two headlands P and Q are separated by water. In order to find the distance between them, a third point A is chosen from which both P and Q are visible. The following measurements are taken:

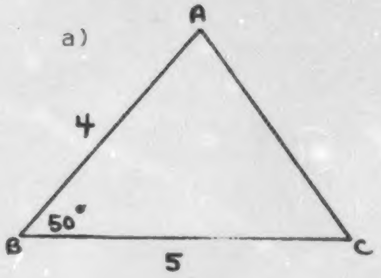
   AP = 347.5
   AQ = 562.5
   ∠PAQ = 58°30'

   Find the distance PQ.

3. Point B is inaccessible from either A or C, since it is on the opposite side of a large swampy area. A surveyor is required to find the distance from A to C, A and C are in the same horizontal line and 339.5 metres apart. The angle BAC is measured at 78°19' and the angle ACB is measured at 47°14'. Find the distance AB.

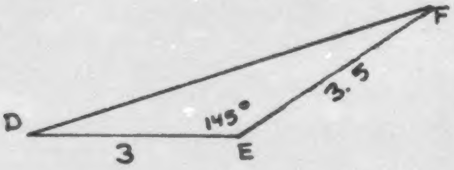
II. 1. Use the Law of Cosines for the following:

a)



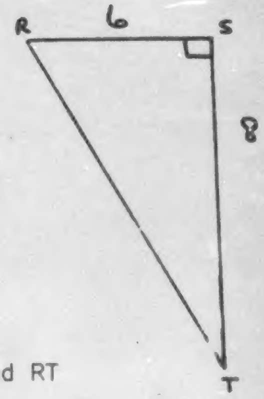
Find AC

b)



Find DF

c)



Find RT

d) ΔHJK, HJ = 9, HK = 12, JK = 13, Find ∠H.

e) ΔXYZ, XY = 8, YZ = 3, XZ = 8, Find ∠X.

f) ΔMNP, MN = 2.5, MP = 7.3, NP = 5, Find ∠N.

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Cosine Law Problems

1. Kant E. Lever, an engineer, is building a bridge from Point A to Point B across a swamp. At Point C, which is measured at 300 m from A and 400 m from B, the angle BCA is 68°. Find the length AB of the bridge.

2. From Point A on the side of a mountain, two tunnels run through the mountain. Tunnel AB is 500 m long and tunnel AC is 250 m long. Angle BAC is 84°. Find the distance BC between the ends of the tunnels.

3. From a point P on shore, 2 harbour buoys are 24° apart. The distance from P to one buoy Q is 200 m and the distance from P to the other buoy R is 500 m. How far apart are the buoys to the nearest tenth of a metre?

12. Solve the following problems which require the use of Trig Ratios, the Law of Sines or the Law of Cosines.

1. Two fire towers are situated 15 km apart on an east-west line. The fire warden in the west tower sees a fire at 30° east of north. The fire warden in the east tower sees the same fire 15° west of north. How far is each tower from the fire?

2. From the top of a cliff 180 m in height, the angles of depression to points B and C on the ground and in line with the base of the cliff are 50° and 20° respectively. Find the distance from B to C.

3. Two ships leave port A at the same time. One ship sails 300 km to port B in a direction 40° west of north. The other ship sails 500 km to port C in a direction 10° west of south. How far apart are ports B and C?

4. A person west of a tower notes that the angle of elevation of the top of the tower is 53°. A person east of the tower notes that the angle of elevation of the top of the tower is 37°. If the tower is 230 m in height, how far apart are the two people?

5. Two sides of a triangle are 35 cm and 43 cm, and the angle contained between them is 64°. What is the length of the third side?

6. From a point A, the angle of elevation of the top of a cliff is 35°. From a point B, in a straight line between A and the base of the cliff C, the angle of elevation is 46°. If the distance from A to B is 120 m, how high is the cliff?

7. A bridge is 400 m in length. Observed from one end of the bridge, point A, a boat on the river beneath has an angle of depression of 62°. From the other end of the bridge, point B, the angle of depression of the same boat is 32°.

   a) What is the distance from point A on the bridge to the boat below?
   b) What is the perpendicular distance from a point on the bridge to the boat below?

8. The distance from a point A on the shore to boats B and C on the water is 520 m and 430 m, respectively. If the two boats are 880 m apart, calculate the size of ∠BAC.

9. A ladder, 10 m long, can just reach the top of a building when the ladder makes an angle of 70° with the ground. If the base of the ladder is moved another metre from the wall:

   a) Where will the top of the ladder be now, in relation to the top of the building?

   b) What angle will the ladder now make with the ground?

10. Find the smallest angle of the triangle with sides 8 cm, 10 cm and 12 cm. (Note: The smallest angle is always opposite the shortest side.)

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C.III. TRIGONOMETRY (I MODULE) - ANSWERS

1,2.

1. a) AB ⟷ DE   ∠A ⟷ ∠D
BC ⟷ EF   ∠B ⟷ ∠E
AC ⟷ DF   ∠C ⟷ ∠F

b) XZ ⟷ RT   ∠Y ⟷ ∠S
YZ ⟷ RS   ∠X ⟷ ∠T
XY ⟷ ST   ∠Z ⟷ ∠R

c) JK ⟷ MN   ∠H ⟷ ∠P
HJ ⟷ MP   ∠K ⟷ ∠N
HK ⟷ NP   ∠J ⟷ ∠M

d) AD ⟷ BD   ∠C ⟷ ∠E
BC ⟷ DE   ∠B ⟷ ∠ADE
DC ⟷ AE   ∠BDC ⟷ ∠A

e) XY ⟷ ST   ∠XZY ⟷ ∠SZT
XZ ⟷ TZ   ∠X ⟷ ∠T
YZ ⟷ SZ   ∠Y ⟷ ∠S

f) BD ⟷ DB   ∠A ⟷ ∠C
AB ⟷ CD   ∠ABD ⟷ ∠BDC
AD ⟷ BC   ∠ADB ⟷ ∠DBC

g) DE ⟷ HK   ∠DFE ⟷ ∠HFK
DF ⟷ HF   ∠H ⟷ ∠D
EF ⟷ KF   ∠K ⟷ ∠E

h) MP ⟷ PR   ∠M ⟷ ∠R
NP ⟷ PS   ∠N ⟷ ∠S
MN ⟷ RS   ∠MPN ⟷ ∠RPS

3.

1. a) $\frac{12}{x} = \frac{8}{16}$; $x = 24$ cm

$\frac{12}{20} = \frac{8}{y}$; $y = 13\frac{1}{3} = 133.3$ mm

b) Note: All sides of an equilateral triangle are of the same length. Therefore, y = 4 cm and x = 5 cm. Equivalent ratios are redundant for this exercise.

c) Note: In isosceles triangles, equal angles have equal sides opposite them. Therefore, x = 6.6 cm and y = 2.2 cm. Equivalent ratios are redundant in this exercise.

d) $\frac{8}{x} = \frac{20}{15}$; x = 6 cm

$\frac{10}{8} = \frac{y}{20}$; y = 25 cm

e) x = 10 cm, y = 3.5 cm

f) $\frac{x + 2.5}{6} = \frac{2.5}{1.5}$; x = 7.5 cm

$\frac{y + 6}{6} = \frac{y}{1.5}$; y = 2 cm

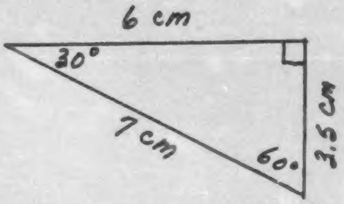
g) x = 4.5 cm; y = 8 cm

h) x = 14.4 cm; y = 25/7 cm

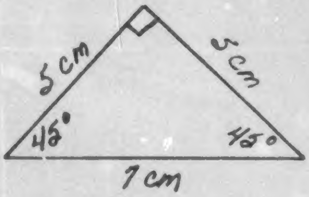
4. 1.

a)	13	5	12	5/13	12/13	5/12
b)	4 $\overline{2}$	4	4	1/ $\overline{2}$	1/ $\overline{2}$	1
c)	10	6	8	6/10	8/10	6/8
d)	2	$\overline{3}$	1	$\overline{3}$/2	1/2	$\overline{3}$
e)	$\overline{34}$	5	3	5/ $\overline{34}$	3/ $\overline{34}$	5/3

2. a)



b)



Function/Angle	60	30	45
Sine	0.85714	0.50000	0.71429
Cosine	0.50000	0.85714	0.71429
Tangent	1.71429	0.58333	1.00000

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5. 1.
- a) 0.86603
- b) 0.50000
- c) 1.73205
- d) 0.50000
- e) 0.86603
- f) 0.57735
- g) 0.70711
- h) 0.70711
- i) 1.00000

2. a) 0.17365
b) 0.92051
c) 1.07237
d) 0.98769
e) 0.96126
f) 1.66428
g) 0.76604
h) 0.30902
i) 0.03492
j) 0.89101
k) 0.01745
l) 0.60086

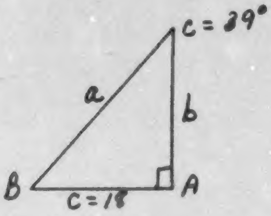
6.

1. a) $\angle A = 45^\circ$; $b = 10.61$
b) $\angle F = 30^\circ$; $e = 14$
c) $\angle S = 70^\circ$

Sine $20^\circ = 5/t$
$t = 5/\text{sine } 20$
$t = 14.62$

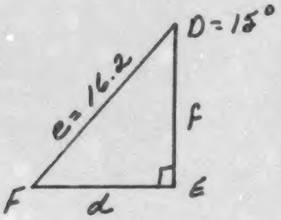
Tan $20^\circ = 5/s$
$s = 5/\tan 20$
$s = 13.74$

2. a) $\angle A = 48^\circ$, $c = 13.38$, $a = 14.86$
b) $\angle F = 35^\circ$, $d = 6.102$, $e = 4.99$
c)



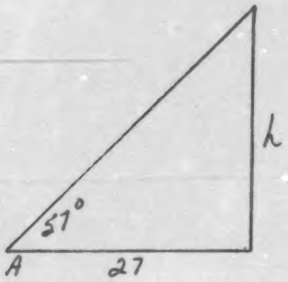
$\angle B = 51^\circ$
$a = 28.6$
$b = 22.23$

d)



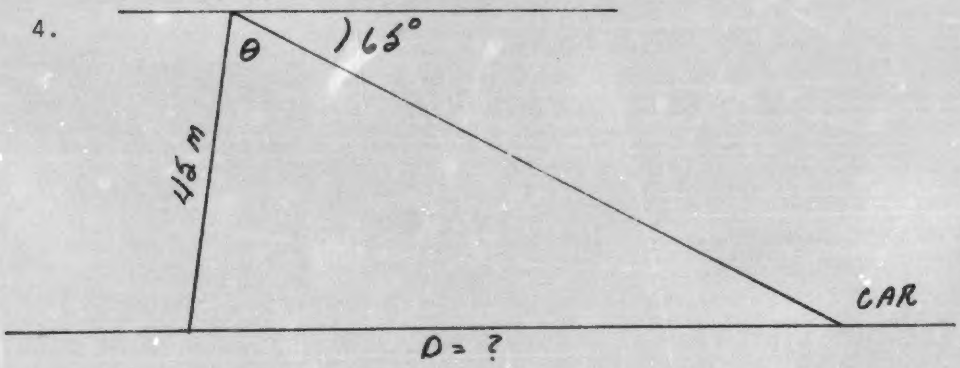
$\angle F = 75^\circ$
$f = 15.65$
$d = 4.19$

3.



Tan 57 = h/27
h = 27(Tan 57)
h = 41.58 m

4.

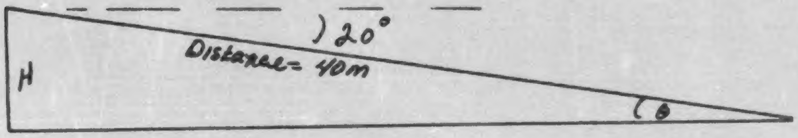

)65°
θ
45 m
CAR
D = ?

θ = 35°

Tan θ = D/45

D = 45(Tan 35); D = 31.51 m

5.


)20°
Distance = 40m
H
(θ

θ = 20°

Sine θ = H/40

H = 40(Sine 20) = 13.68 m

7.

1. a) θ = 36.87°
   b) θ = 45°
   c) θ = 53.13°
   d) θ = 45°
   e) θ = 48.19°
   f) θ = 24.58°

2. a) θ = 15°
   b) θ = 72°
   c) θ = 55°
   d) θ = 36°
   e) θ = 28°
   f) θ = 45°
   g) θ = 61°
   h) θ = 3°
   i) θ = 88°

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8.

1. a) $x = 25$
$\theta = 73.74^{\circ}$
$\gamma = 16.26^{\circ}$

b) $x = 6.508$
$\theta = 56.54^{\circ}$
$\gamma = 33.46^{\circ}$

c) $x = 9$
$\theta = 77.32^{\circ}$
$\gamma = 12.68^{\circ}$

2. a) $c = 7.2$
$\angle C = 47.92^{\circ}$
$\angle B = 42.08^{\circ}$

b) $f = 17.2$
$\angle D = 54.46^{\circ}$
$\angle E = 35.54^{\circ}$

c) $t = 34.56$
$\angle T = 45.75^{\circ}$
$\angle R = 44.25^{\circ}$

3. 28.07° = angle of elevation

4. $\theta = 55.08^{\circ}$
$b = 5.72$ m

5. $AC = 9.7$
$\theta = 47.92^{\circ}$

9.

1. a) 0.98481
b) -0.5
c) -0.57735
d) 0.70711
e) -0.98481
f) -11.43005
g) 0.25882
h) -1.0
i) -1.96261
j) 1.0

10.

1. a) $\angle A = 180 - (55 + 65) = 60^{\circ}$

$$\frac{b}{\text{Sine B}} = \frac{c}{\text{Sine C}} \quad \text{and} \quad \frac{b}{\text{Sine 55}} = \frac{15}{\text{Sine 65}}$$

$$b = \frac{14(\text{Sine 55})}{\text{Sine 65}} = 12.65$$

$a = 13.38$

b) $$\frac{e}{\text{Sine E}} = \frac{f}{\text{Sine F}} \quad \text{and} \quad \frac{6.5}{\text{Sine 125}} = \frac{3}{\text{Sine F}}$$

$\angle F = 22.21^{\circ}$
$\angle D = 180 - (125 + 22.21) + 32.79^{\circ}$

$d = 4.3$

c) $t = 15$

$R = 53.13^{\circ}$

$T = 36.87^{\circ}$

2. a) $17.54 = z$
   b) $10.44 = n$
   c) $\angle H = 15.07^\circ$

Law of Sines Problems

1. 591 m   2. 483 m   3. 306 m

11.

1. a) $AC = 3.78$
   b) $DF = 6.2$
   c) $RT = 10$
   d) $\angle H = 75^\circ$
   e) $\angle X = 21.6^\circ$
   f) $\angle N = 152^\circ$

Cosine Law Problems

1. 183 m   2. 535 m   3. 85.4 m

12.

1. West tower is 20.5 km away
   East tower is 18.4 km away
2. $BC = 343.5$ m
3. B to C is 730 km
4. 478.5 m apart
5. 41.89 cm
6. 259.5 m
7. a) 212.5 m
   b) 187.6 m
8. $\angle A = 135.5^\circ$
9. a) 0.427 lower
   b) $\theta = 63.77^\circ$
10. 41.41°

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C.IV. STATISTICS (1 MODULE)

Statistics is the study of obtaining, analyzing, presenting and interpreting numerical data.

A.

1. Collect ten newspaper articles which indicate that data was collected and tabulated, and the results obtained were used to support an argument.

2. Discuss the ramifications and validity of the following statements.

   a) "9% of all children born today are born to children"
      - speaker at a political policy convention, 1983

   b) "of the 1978-79 international immigrants to Manitoba under 18 years of age, 57% spoke neither of Canada's official languages; 42% spoke English; 1% spoke French"
      - Interprovincial and International Migration of Children In Manitoba - Research Branch, Dept. of Education

   c) "I'm at 95% health right now but I intend to give 150%"
      - interview of athlete at half-time

   d) Wilkie's Strawberry Jam is 99.4% pure.

   e) In 100 000 kilometres of torturous road test, the new 4 x 4 Buckaroos had less than a 0.5% repair record.

   f) In a recent study, the surge of flush power at the local waterworks pumping station coincided with the time of the commercial breaks during the T.V. shows with the highest ratings.

   g) 70% of doctors interviewed recommended Lily's Little Liver Pills for relief from tension headaches.

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3.

NET INTERPROVINCIAL MOVEMENT OF CHILDREN UNDER 18 YEARS OF AGE
75-76 TO 79-80
JULY 1 TO JUNE 31

Province	NET INTERPROVINCIAL MIGRATION* 75-76	76-77	77-78	78-79	79-80
Newfoundland	+ 210	+ 907	- 1,181	- 912	- 614
Prince Edward Island	+ 185	+ 420	+ 317	+ 85	+ 125
Nova Scotia	+ 931	- 173	+ 79	+ 218	- 330
New Brunswick	+1,799	+ 355	+ 168	- 16	- 200
Quebec	-2,970	-6,546	-12,354	-8,049	- 7,699
Ontario	-7,209	-1,965	+ 2,596	-2,664	- 6.129
Manitoba	-1,927	-1,000	- 2,157	-3,340	- 4,638
Saskatchewan	+2,183	+1,907	+ 94	+ 307	+ 46
Alberta	+7,979	+7,911	+ 8,114	+9,346	+ 9,070
British Columbia	-1,025	+ 447	+ 4,542	+5,541	+11,107
Yukon and N.W.T.	- 138	- 449	- 218	- 516	- 747

*Figures exclude 16 and 17 year olds with taxable income. Source: Statistics Canada. A negative figure indicates a net loss. A positive figure indicates a net gain.

a) Identify the province which experienced the greatest net interprovincial gain in children under 18 in each of the years 75-76 to 79-80.

b) Identify the province which experienced the greatest net interprovincial loss in children under 18 in each of the years 75-76 to 79-80.

c) Which province had the greatest net loss over the five year period? Which province showed the greatest net gain over the five years?

d) Under the following headings, discuss the implications for Manitoba education of the movement of children under 18:

- i) subject content between provinces
- ii) building of new schools
- iii) job prospects for students entering Education

e) Under the following headings, discuss the implications for Manitobans of a net loss in children under 18:

- i) the construction industry - schools, residences
- ii) pension plans
- iii) manufacturers
- iv) political party platforms

B. DATA GATHERING

In a census, measurements are obtained from every member of the "population." When the mass of data to be obtained is too great to handle in its entirety, a sample is studied. The results from this sample are then applied to the population. In a random sample, every member of the population has an equal chance of being selected. In a stratified sample, the population is divided into homogeneous subgroups and responses are drawn from each subgroup at random. For example, in a city with identifiable ethnic groups, if 30% of the entire population were of a certain ethnic group, then the members of this group should make up 30% of the sample.

1. Identify whether a researcher should use a census or a sample to obtain data for each of the following:

   a) to determine whether the grade XII graduating class wear caps and gowns for graduation or dresses and tuxedos

   b) to determine the reliability of camera flash cubes

   c) to determine the job prospects for students graduating from universities

   d) to determine the popularity of "Evening in Kronstal" over other colognes

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2. *List 4 different methods that could be used to obtain data from a sample or a population.*

3. A sample can be biased. Give four examples of situations where the selection of a sample may bias the results.

4. How could a researcher select a sample, representative of a population, to determine:

   a) the people's choice for mayor in a city of 50 000

   b) the market potential for "Better Built Mousetraps"

   c) the possible controversy generated by the "introduction" of some controversial legislation such as capital punishment

C. UNGROUPED DATA

Measure of Central Tendency

The mode, the mean and the median of a set of data are 'averages' or measures of central tendency.

The mode of a set of data is the measure that occurs most frequently.

The mean, or arithmetic mean, is obtained by dividing the sum of the measures by the number of measures

$$\overline{X} = \Sigma \frac{(x_1 + x_2 + x_3 \ldots)}{N}$$

Where $\overline{X}$, read bar x, represents the mean, the Greek letter, Sigma Σ, means "the sum of"; x_1, x_2 ... represents the measures, and N represents the number of measures.

The median is the value of the middle measure when the measures are arranged in order of magnitude. Where the number of measures is even, the median is the arithmetic mean of the two central measures.

1. Find the mode, the mean and the median for each of the data sets.

   a) 62, 67, 71, 59, 69, 59

   b) 8, 62, 18, 15, 24, 11, 30, 62, 43

   c) 2, 5, 13, 78, 29, 5, 12

   d) 12, 34, 30, 16, 23, 18, 23, 28

2. With reference to the answers obtained in the previous question:

   a) Which of the three measures of central tendency is influenced by extreme scores?

   b) Which measure of central tendency is not influenced by an extreme score?

   c) Why is the mode not representative of central tendency in 1(a) or in 1(c)?

   d) In 1(d) the mode, mean and median are identical. Why is this the case?

3. The employees of King Midas Sweatshop receive hourly wages as follows:

Employee	Hourly Wage
Craig	$4.00
Jeff	$4.50
Susanna	$4.50
Ronda	$4.50
Ryan	$4.50
Dawn	$5.00
Blaine	$5.00
Dietrich	$6.00
Kevin	$6.50
Mr. Midas	$35.00

   a) Calculate the mode, the mean, and the median wages for the workers in the Sweatshop.

   b) Which "average" would the negotiator for the employees publish to justify demands for increased wages?

   c) Which "average" would Mr. Midas publish to counter the demands by the employees?

4. In designing a bridge, an engineer has to take into account the load the bridge will have to support. Which of the measures of central tendency should the engineer consider: the weight of the most frequently occuring load, the weight of the mean load or the weight of the median load? Explain.

5. Water freezing in a water-cooled engine expands and can crack the engine block. In preparing a solution of antifreeze should the mode, the mean or the median winter temperature be considered?

6. A students' council wishes to sell T-shirts as a fund-raising project. In selecting sizes it will sell, should the council consider the mode, mean or median?

Measures of Dispersion

Three persons have heights of 183, 173 and 168 cm. Another group has heights of 191, 175 and 160 cm.

Although the mean for both groups is 175.3 cm, there is a difference between the groups. The range is a measure of variability or dispersion which indicates the spread between the high and the low measures. The range for the first group is 183-168 = 15 while the range for the second group is 31.

7.

Varsity Basketball			
Field Goals Missed in Ten Games			
Player #31		Player #45	
20	24	21	20
26	10	16	24
18	14	25	17
30	20	19	20
16	22	15	23

a) Calculate the range of Field Goals missed for each player.

b) Calculate and compare the mode, the mean and the median for each player's data.

c) Assuming each player attempted the same number of shots, which player would you as coach insert into the line up during the last three minutes of play with the score tied at 83? Explain.

8. Calculate the range for each of the data sets:

a) 20, 17, 18, 24, 3, 18, 21

b) 4, 8, 0, 7, 6, 9, 3

c) 48.3, 79.2, 68.5, 21.9

9. Another measure of dispersement is the mean deviation. The mean deviation is the mean of the absolute values of the differences from the mean.

Field goals missed:

Player #31	
Data	Deviation from the Mean
10	20-10 = 10
14	20-14 = 6
16	20-16 = 4
18	20-18 = 2
20	20-20 = 0
20	20-20 = 0
22	22-20 = 2
24	24-20 = 4
26	26-20 = 6
30	30-20 = 10
	Sum 44

Player #45	
Data	Deviation from the Mean
15	
16	
17	
19	
20	
20	
21	
23	
24	
25	
	Sum

The sum of the deviations from the mean for player #31 is 44. The mean of the deviations from the mean is 44 ÷ 10 = 4.4.

a) Calculate the mean deviation for Player #45.

b) In comparing the mean deviations for the two players, which player is more consistent?

10. Calculate the mean and mean deviation for each of the following (to the nearest tenth):
   a) $30 000; $34 000; $36 000; $38 000; $86 000; $74 200
   b) 20, 17, 23, 8, 4, 5, 3, 1, 14
   c) 65, 38, 86, 95, 46, 72, 85
   d) 40, 52, 48, 35, 30, 29, 33, 28
   e) 361, 60, 344, 472, 3335, 2010, 369, 353, 531, 487
   f) 6.0, 5.8, 4.9, 4.8, 6.2, 6.4, 6.6, 7.0, 6.7, 6.4, 8.1, 8.4, 5.4
   g) 12 salaries of $13 500; 8 salaries of $17 000; and 4 salaries of $21 300
   h) 6 tractors at 6040 kg, 4 tractors at 8280 kg, and 2 at 12 040 kg
   i) 30 people 183 cm tall, 25 at 175 cm tall, 15 at 170 cm tall, 8 at 167 cm, and 3 at 160 cm
   j) 8 marks of 93%, 6 of 87%, 5 of 76%, 12 of 69%, 3 of 60%, 2 of 43%
   k) 1 pig weighing 136 kg, 3 at 144 kg, 7 at 129 kg, and 5 at 154 kg

11. Find the median of each of the sets of data in questions 10(a-f).

D. GROUPED DATA

Frequency Distribution Table

Where a large mass of numerical data is involved, the data is arranged systematically before it is analyzed. The table below is called a Frequency Distribution Table, which has grouped the mass in kilograms of 89 grade XII students into 11 classes, each class having a width of 5 kg.

1. Frequency Distribution Tables

a) Complete the frequency column (D) using the information illustrated in the tally column (C).
Note: represents five units.

b) Complete Column E by multiplying the class mark by the frequency of occurrence.

FREQUENCY DISTRIBUTION TABLE

A	B	C	D	E	F
Class Boundaries in Kilograms	Class Mark x	Tally	Frequency f	x•f	Cumulative Frequency
37.5 - 42.5	40	||			
42.5 - 47.5	45	||			
47.5 - 52.5	50	卌 |||			
52.5 - 57.5	55	卌 卌 卌 |			
57.5 - 62.5	60	卌 卌 卌 |||			
62.5 - 67.5	65	卌 卌 ||||			
67.5 - 72.5	70	卌 卌 ||			
72.5 - 77.5	75	卌 |			
77.5 - 82.5	80	卌 |			
82.5 - 87.5	85	卌			
87.5 - 92.5	90	|			

2. Seventy-seven students entered the Annual Basketball Freethrow Shootout. Each took 100 consecutive shots and the number of baskets sunk were as follows:

68	89	82	77	63	59	60	69
74	67	87	62	71	85	77	83
77	63	53	81	66	96	62	60
69	57	81	85	88	77	64	77
84	80	55	67	74	69	77	71
60	68	74	69	73	64	71	83
70	75	66	76	79	70	76	72
78	76	73	71	83	79	89	
78	80	74	68	78	69	74	
71	72	63	72	69	65	86	

Complete the frequency distribution table below with class intervals of 5, with the lowest class boundaries from 52.5 - 57.5.

BASKETBALL FREETHROW SHOOTOUT

	Class Boundaries	Class Mark	Tally	Frequency f	Class Mark times frequency x•f
1.	52.5 - 57.5	55			
2.	57.5 -				
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

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3. The heights in centimetres of fifty employees of the Denzil Diesel Company were recorded (many of the men play in the community's Senior Basketball League). Complete the frequency distribution table below. Use 148.5-155.5 as the lowest class interval.

176	149	163	154	203	198	164	168	165	179
192	156	152	172	197	196	200	187	177	193
173	160	170	177	189	188	194	173	166	181
190	163	171	184	175	186	169	167	161	174
191	169	183	185	180	199	195	179	178	181

Class Boundaries	Class Mark x	Tally	Frequency f	$x \cdot f$

4. Project A:

Construct a frequency distribution table showing the end digits of sales prices quoted in the ads of a daily newspaper or sales flyer. Compare your findings with your classmates. Which digits appear most frequently? Why?

5. Project B:

Prepare a frequency distribution table, with class intervals of $1000, displaying the prices of three year old cars as advertised in a Saturday edition of a daily newspaper.

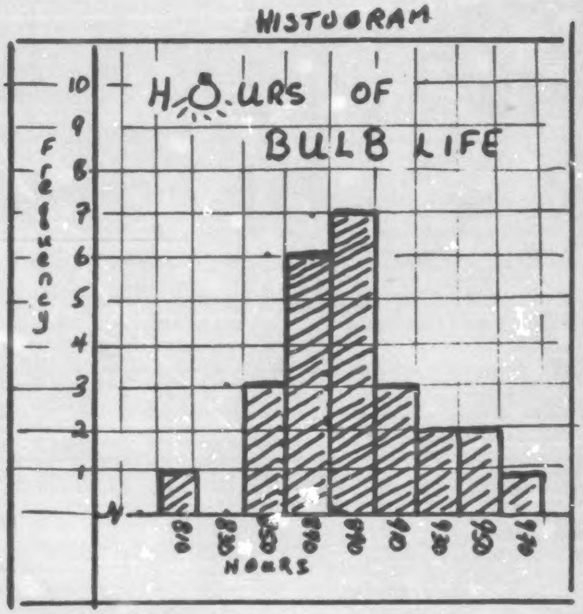
Histogram

A histogram is a graphic representation of the information in a frequency distribution table.

Frequency Distribution Table **Histogram**

Bulb Life Expectancy of Everglow Light Bulbs

Class Boundaries Hours	Class Mark	Tally	Frequency	Class Mark times Frequency	Cumulative Frequency
960-979	970	/	1	970	25
940-959	950	//	2	1900	24
920-939	930	//	2	1860	22
900-919	910	///	3	2730	20
880-899	890	𝍸//	7	6230	17
[illegible]60-879	870	𝍸/	6	5220	10
[illegible]40-859	850	///	3	2550	4
820-839	830		0	0	0
800-819	810	/	1	810	1
			25	22 270	



In a histogram the vertical axis represents the frequency while the class marks are on the horizontal axis. Notice that, unlike a bar graph, there are no spaces between the bars of a histogram.

6, 7, 8, Construct a histogram to graphically illustrate the information in D, 1-5.
9, 10.

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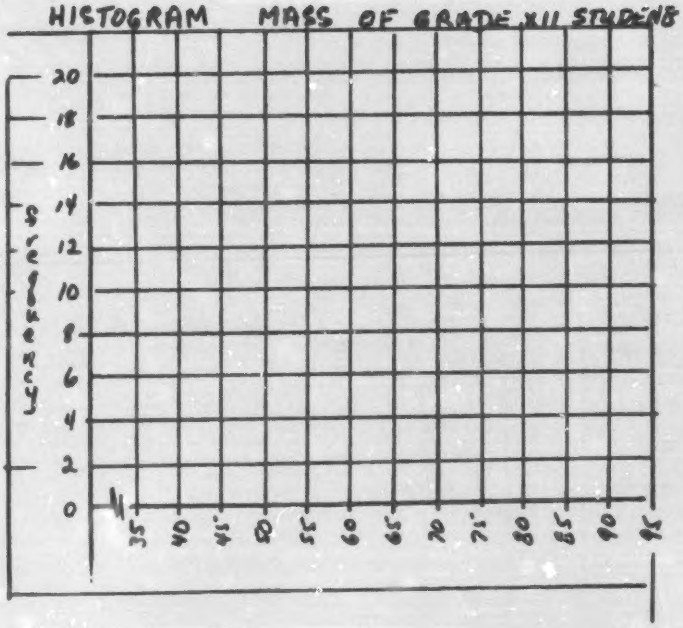
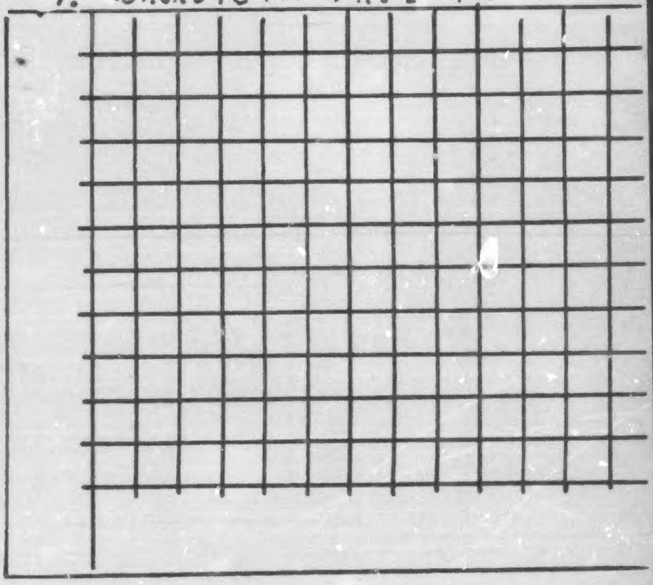
6. HISTOGRAM MASS OF GRADE XII STUDENTS

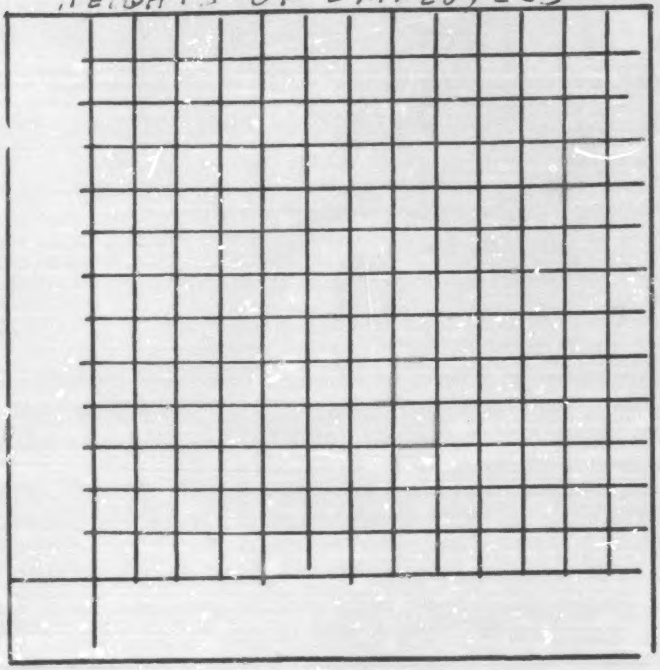


7. BASKETBALL FREE THROWS



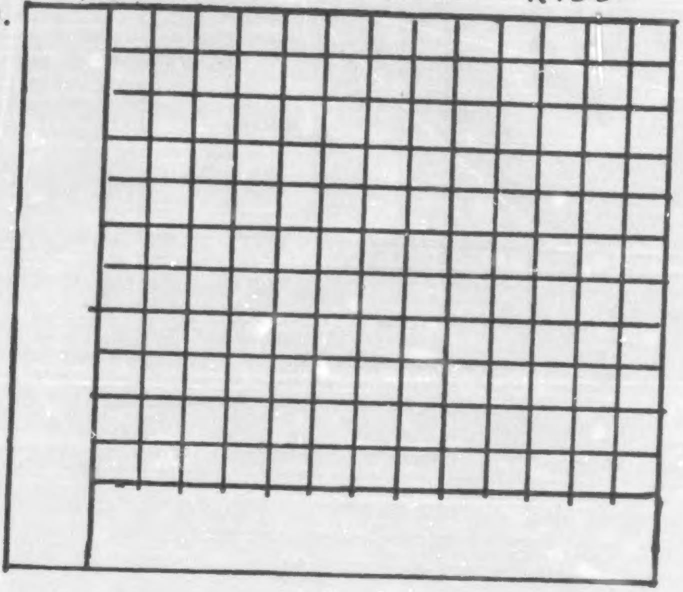
HEIGHTS OF EMPLOYEES

8.



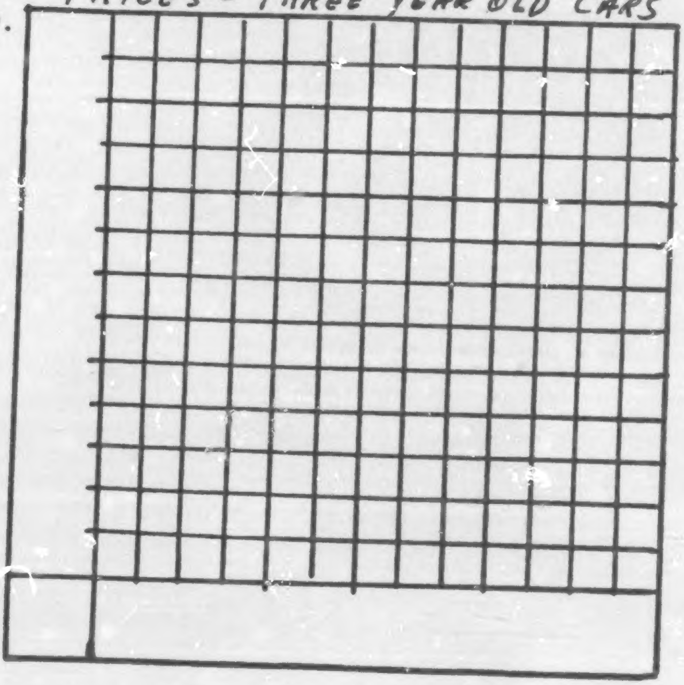
END DIGITS OF SALE PRICES

9.



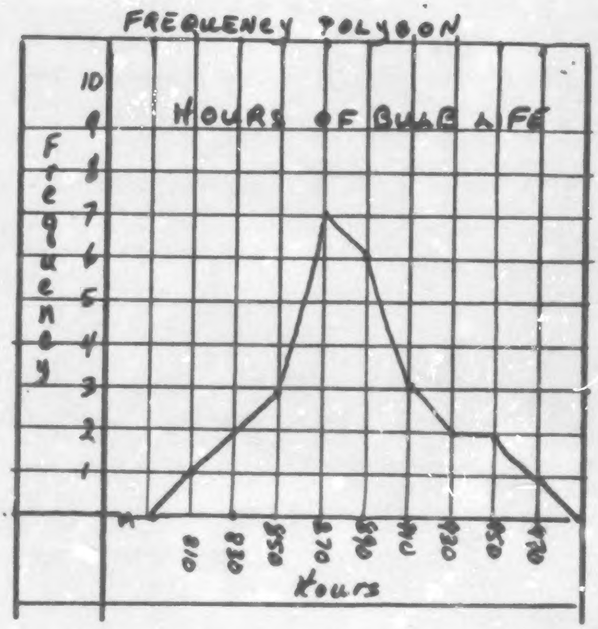
PRICES - THREE YEAR OLD CARS

10.

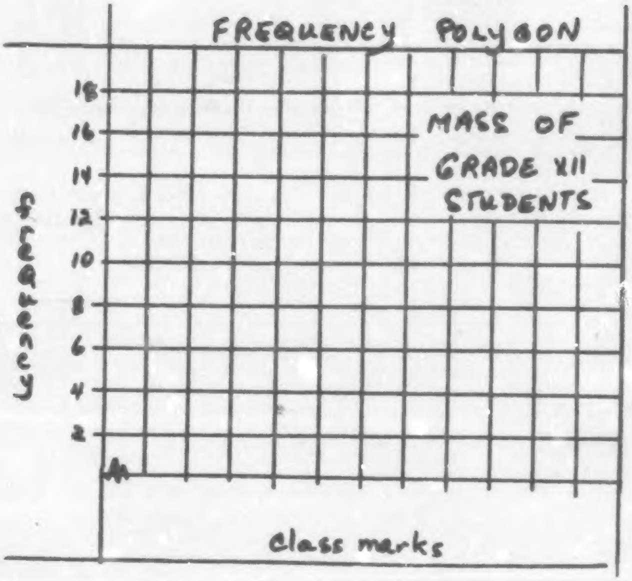


11. Frequency Polygon

In a frequency polygon the frequency of consecutive class marks are connected by segments, creating a polygon. This type of illustration is preferred if the statistician wishes to work with percentiles.



Draw the frequency polygon to illustrate the information in D.I.



Measures of Central Tendency from Grouped Data

The five measures 3, 4, 6, 6, 6 have a mode of 6, a mean of 5, and a median of 6. If these measures were elements of a class with a boundary from 2-6, the measures would lose their individuality.

Class Boundary	Class Mark	Tally	Frequency
2-6	4	𝍸	5

The datem would also become evenly distributed within the class. The mode would now be 4 and the mean would be 4.

The mode of grouped data is the class mark occurring most frequently. In the frequency table below the mode is 890.

The mean of grouped data is obtained by dividing the sum of the numbers in the x•f column by the sum of the frequency column (N)

$$\frac{\Sigma(x \cdot f)}{N}$$

The mean bulb life from the table below is $\frac{22270}{25} = 891$

The median of grouped data is the measure of the middle element of the set. In the set of 25 illustrated, the median would be the measure of the 13th element. From the cumulative frequency column, it is evident that the 13th element is the third member of the group of seven whose class boundaries are 880 and 899 (class width of 20).
The mark of the 13th element would be $\frac{3}{7}$ of the way into the class whose lower limit is 880.

Calculation:

$$Md = \frac{3}{7} \times \underset{\substack{\uparrow \\ \text{class} \\ \text{width}}}{20} + \underset{\substack{\uparrow \\ \text{lower} \\ \text{limit of} \\ \text{class}}}{880} = \underline{888.6}$$

(Note: the Md from the ungrouped set was 883)

HOURS OF BULB LIFE
FREQUENCY DISTRIBUTION TABLE

Class Boundaries	Class mark x	Tally	Frequency (f)	x·f Class mark times frequency	Cumulative Frequency
960-979	970	/	1	970	25
940-959	950	//	2	1900	24
920-939	930	//	2	1860	22
900-919	910	///	3	2730	20
880-899	890	𝍸 //	7	6230	17
860-879	870	𝍸 /	6	5220	10
840-859	850	///	3	2550	4
820-839	830		0	0	0
800-819	810	/	1	810	1
			25	22,270	

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12. Refer to the five questions in D.I.

    a) Complete the cumulative frequency columns (F).

    b) Calculate the median, the mean, and the mode for each of the five questions.

Measures of Dispersion or Variability

13. The range for grouped data is the difference (spread) between the highest and lowest class marks. Calculate the range for the grouped data in the first problem in D.I.

14. The mean deviation from the mean for grouped data is obtained in the following manner:

    a) calculate the absolute value of the difference between the class mark and the mean

    b) for each class find the product of this difference and the frequency

    c) total the column $\Sigma|\bar{x} - x|$

    d) divide the sum of this column by the sum of the frequencies

$$M.D. = \frac{\Sigma f \cdot |\bar{x} - x|}{N}$$

Complete the following table.

Hours of Bulb Life

Class Mark Hours	Frequency f	Deviation from the Mean $\lvert\bar{x} - x\rvert$	Deviation from the Mean times frequency $f \cdot \lvert\bar{x} - x\rvert$
970	1	$\lvert 891-970\rvert = 79$	79
950	2	$\lvert 891-950\rvert = 59$	118
930	2	$\lvert 891-930\rvert = 39$	78
910	3	$\lvert 891-910\rvert$	
890	7		
870	6		
850	3		
830	0		
810	1		

Total the frequency column and the $f \cdot |\bar{x} - x|$ column.

Now find the Mean Deviation $M.D. = \frac{\Sigma f \cdot |\bar{x} - x|}{N}$

15. Calculate the mean deviation for the heights of the employees of the Denzil Diesel Company in problem D.3.

Class Mark	Frequency f	Deviation from the Mean $\lvert\bar{x} - x\rvert$	Deviation from the Mean times Frequency $f \cdot \lvert\bar{x} - x\rvert$
	N =		$\Sigma f \cdot \lvert\bar{x} - x\rvert =$

E. PERCENTILES

Students in many Manitoba schools write DAT tests in grade nine.

A student's achievement on the test is compared with students in a national group in that grade. Together with the counsellor, the student can get an aptitude profile which suggests areas of strengths.

If a student scores in the 80th percentile in a section of the test such as Verbal Reasoning, this means that only 20% of the national group had higher scores while 80% of the national group had lower scores.

Examine the results of the DAT tests for Student A and Student B and compare.

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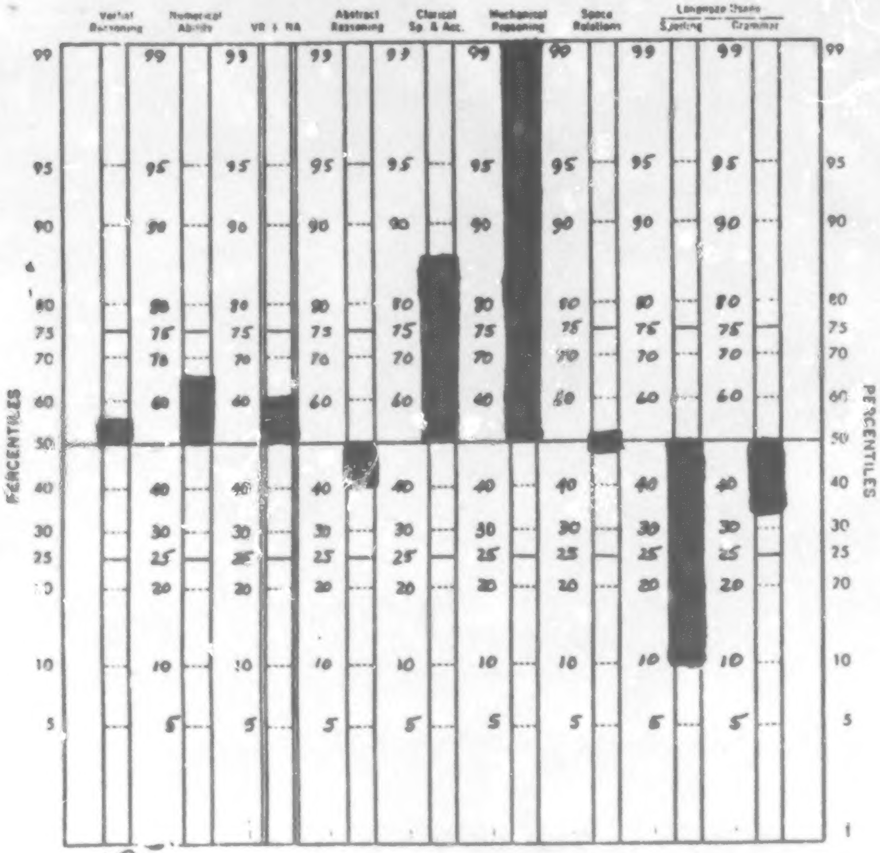
DIFFERENTIAL APTITUDE TESTS [1963 EDITION]

G. K. Bennett, H. G. Seashore, and A. G. Wesman

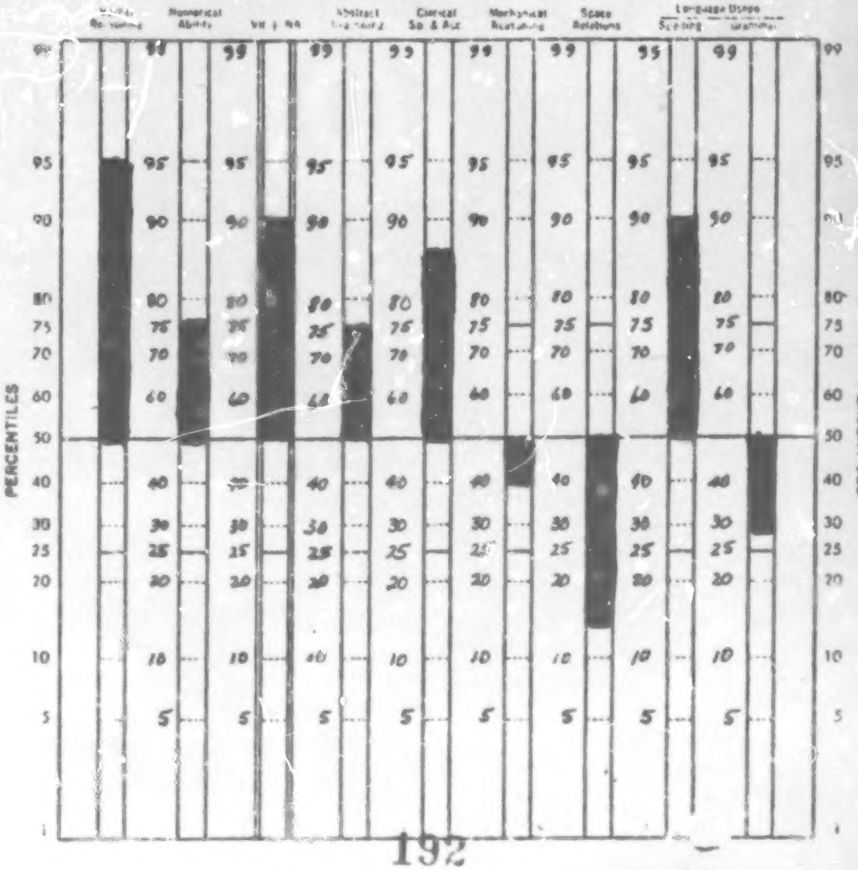
Name STUDENT A
Year 1982 Form L Grade 9 Sex M

	Verbal Reasoning	Numerical Ability	VR + NA	Abstract Reasoning	Clerical Sp. & Acc.	Mechanical Reasoning	Space Relations	Language Usage: Spelling	Language Usage: Grammar
Raw Score	27	26	53	33	59	63	29	63	32
Percentile	55	65	60	40	85	99	50	25	45



Name STUDENT B
Year 82 Form L Grade 9 Sex F

	Verbal Reasoning	Numerical Ability	VR + NA	Abstract Reasoning	Clerical Sp. & Acc.	Mechanical Reasoning	Space Relations	Language Usage: Spelling	Language Usage: Grammar
Raw Score	41	28	69	40	69	36	15	92	33
Percentile	95	75	90	75	85	40	15	90	30



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1. Which aptitude appears to be strongest for A?

2. What percent of the students across the country scored lower than A in Abstract Reasoning?

3. What is student A's greatest weakness?

4. i) In which subjects in grade ten would you expect student A to excel?

   ii) Which subjects will give A the greatest difficulty?

5. How may the results of the DAT test assist the student in making course selections?

6. Suggest possible careers in which A might be successful.

7. Are the results of the DAT test perfectly accurate? Why might the results not be correct?

8. Student B is at the 90 percentile in VR & NA (Verbal Reasoning and Numerical Ability). What percent of the thousands of students in numerous schools across Canada outscored Student B?

9. In which grade ten subjects would B be expected to have the lowest marks?

10. Student B is planning a career as an English teacher or as a journalist. What advice would you, as a counsellor, give her?

Review Exercises

A. 1. The following vital statistics are given for the Winnipeg Blue Bombers football team 1982 season.

NAME	NO.	HEIGHT (cm)	WEIGHT (kg)
Bastaja	65	188	116
Bennett	27	178	88
Bonk	43	188	111
Brock	5	183	86
Burrell	22	183	88
Cameron	6	183	84
Catan	53	188	109
Cherkas	60	193	109
Ciancone	76	193	95
Collymore	25	185	84
Ezerins	72	193	102
Faggiani	58	193	118
Flagel	14	188	90
Goodlow	34	185	86
Helton	99	191	116
Hentschel	52	191	120
Holmes	70	188	88
House	31	178	82
Huclack	30	188	93
Jackson	7	183	88
Johnson	80	183	88
Jones	32	183	95
Kennerd	3	168	85
Kunihowski	73	191	86
Luckie	62	188	123
MacIver	64	191	111
Mikawos	79	193	111
Miller	33	172	86
Norman	55	196	113
O'Doherty	79	183	84
Pahl	54	188	102
Pearson	38	180	98
Phason	9	178	86
Pierson	8	180	84
Pisarkiewicz	10	188	93
Poplawski	71	185	82
Reed	57	188	104
Smith	56	198	118
Strecter	36	185	86
Thomas	50	185	102
Thompson	61	202	134
Turner	28	178	82
Walby	63	201	125
Williams	20	185	82

a) Construct a frequency distribution table of the following:

i) heights - use 7 classes with a class interval of 5 cm starting with the class 167.5 - 172.5
ii) weights - use 9 classes with a class interval of 6 cm starting with the class 81.5 - 87.5

b) Draw a histogram of the weights and a frequency polygon of the heights.

c) Calculate the mean, median and mode from the table for both height and weight.

d) Calculate the mean deviation for
i) weights
ii) heights

B. 1. A group of 60 students made the following scores on last June's final mathematics exam: 60, 64, 59, 56, 48, 39, 65, 64, 63, 53, 92, 64, 69, 72, 77, 51, 75, 53, 76, 79, 90, 48, 39, 76, 46, 27, 23, 55, 65, 82, 76, 54, 72, 27, 72, 48, 67, 40, 85, 36, 96, 68, 72, 81, 36, 55, 51, 94, 69, 57, 68, 92, 39, 48, 37, 37, 63, 82, 43, 72.

Complete the frequency table for the entire set, using six classes, starting at 22.5 and having a class interval of 13. Record the class boundaries, the class marks, the tally, the frequency, the cumulative frequency less than, and x·f.

Calculate the mean and the median from the table.

CLASS BOUNDARIES	CLASS MARKS (x)	TALLY	FREQUENCY (f)	CUMULATIVE FREQUENCY	x·f
		TOTAL			

2. The following are the number of steak dinners a restaurant served on 50 consecutive Sundays.

41, 52, 46, 42, 46, 36, 44, 68, 58, 44, 49, 48, 48, 65, 52, 50, 45, 72,
45, 43, 47, 49, 57, 44, 48, 49, 45, 47, 48, 43, 45, 56, 61, 54, 51, 47,
42, 53, 44, 45, 58, 55, 43, 63, 38, 42, 43, 46, 49, 47.

Using a class interval of 5, beginning with 34.5, complete the following frequency table.

Class Boundaries	Class Marks	Tally	Frequency	Cumulative Frequency	x•f
		TOTAL			

a) Calculate the mean and the median from the table.

b) Draw a histogram for the above information.

3. Joe was a heavy smoker. Alice, his wife, is a member of G.A.S.P. and detests smoking. In order to convince Joe that he was smoking too much, she kept a record of the number of cigarettes Joe smoked in August and September. The record was as follows:

26	34	46	42	18	28	40	49	28	40
33	35	29	46	40	28	35	30	35	21
40	27	49	33	19	35	28	40	42	21
40	48	29	48	27	40	36	40	32	40
29	41	46	34	26	48	33	40	28	26
40	31	37	47	21	42	48	27	33	40
21									

Complete the following frequency table, using the above data. Use the lowest class boundary of 17.5 and a class width of 4. Give the class boundaries, class marks, tally, frequency (f), cumulative frequency and x·f.

Class Boundaries	Class Marks (x)	Tally	Frequency f	Cumulative Frequency	x·f

Determine the value of the mean and median from the table. Draw a neatly labelled histogram and frequency polygon.

4. Complete the frequency table for the scores obtained in a mathematics contest. Use 10 classes, beginning with 12.5 and having a class interval of 11. Find the mean and median. Draw a polygon.

25	86	71	77	69	53	56	95	79	58
79	59	112	84	75	71	62	58	63	52
90	67	49	81	58	53	74	75	81	68
66	57	90	63	60	47	87	64	92	88
14	73	70	59	41	48	51	64	57	68
84	41	63	93	57	59	44	74	61	59
63	99	45	69	73	79	65	61	54	65
64	68	52	82	50	63	35	58	81	73
58	105	57	90	68	65	47	61	92	88
54	41	68	71	69	77	62	41	82	83

Class Boundaries	Class Marks (x)	Tally	Frequency (f)	Cum. Freq.	x•f
		TOTALS →			

5. The following are the scores obtained by two classes of students on a test. Complete a frequency table with 6 classes having a width of 9 and beginning at 41.5. Determine the mean and median and draw the histogram for this data.

69	68	60	40	86	50	74	63	77	89
69	54	42	64	65	71	81	75	55	70
47	94	76	84	76	87	51	57	60	71
80	79	60	43	56	70	86	79	49	66
59	73	95	70	78	59	84	60	50	78
90	86	78	46	50	91	79	51	48	42

Class Boundaries	Class Marks (x)	Tally	Frequency (f)	Cum. Freq.	x•f
		TOTALS →			

6. Complete the following table and then calculate the mean and median.

Class Boundaries	Class Marks (x)	Frequency (f)	Cumulative Frequency	x·f
21.5-28.5		3		
28.5-35.5		5		
35.5-42.5		8		
42.5-49.5		6		
	TOTALS			

7. Complete the following table and then calculate the mean and median.

Class Boundaries	Class Marks (x)	Frequency (f)	Cumulative Frequency	x·f
13.5-28.5		1		21
28.5-43.5		3		108
43.5-58.5		11		561
58.5-73.5		2		132
73.5-88.5		12		972
88.5-103.5		2		192
	TOTALS			

8. Complete a table using 12 classes, with a class interval of 7 and beginning with 15.5 - 22.5, to determine the mean and the median for the 100 scores following:

93, 86, 79, 72, 65, 68, 58, 60, 51, 44, 37, 32, 28, 22, 95,
87, 80, 72, 65, 68, 58, 60, 51, 45, 39, 35, 28, 29, 35, 41,
45, 52, 60, 58, 69, 65, 73, 82, 88, 90, 82, 73, 66, 69, 36,
42, 47, 52, 61, 58, 58, 69, 61, 66, 53, 75, 48, 83, 91, 48,
84, 75, 54, 67, 69, 59, 62, 84, 77, 67, 70, 59, 62, 55, 62,
59, 70, 67, 77, 84, 63, 85, 60, 77, 71, 71, 67, 78, 68, 60,
63, 78, 68, 71, 60, 63, 64, 64, 64, 43.

C.

1. A Frequency Distribution Table has 6 intervals beginning with 45.5 - 50.5. The frequencies in each interval beginning at the lowest are 4, 6, 14, 16, 7, 3. Complete the table and find the mean, median and mean deviation.

2. 60 scores on a test are distributed on a Frequency Distribution Table containing 9 classes, beginning with 13.5 - 16.5. The frequencies beginning at the lowest interval are as follows: 2, 5, 7, 10, 15, 11, 6, 3, 1. Complete the table and find the mean, median and mean deviation.

3. Use 9 classes, beginning with the interval 5.5 - 10.5 and the following frequencies 1, 3, 5, 9, 15, 16, 5, 4, 2, to complete a frequency distribution table and find the mean, median and mean deviation.

In the following questions, #4 to #9, complete a table (use blank table shown following question #9) and calculate the mean, median, and mean deviation for each question.

4. Using 7 classes beginning with 22.5 - 32.5 and the following frequencies 1, 2, 4, 4, 9, 6, 4, from lowest interval, complete the table.

5. Using 9 classes beginning with the interval 9.5 - 20.5 and the following frequencies 2, 5, 8, 10, 14, 15, 11, 7, 3 from the lowest interval to highest, complete the table.

6. 100 scores in a Mathematics test are arranged in a Frequency Distribution Table of 9 classes beginning with 15.5 - 20.5 and with frequencies of 2, 8, 11, 17, 21, 19, 12, 7, 3, from lowest to highest class, respectively. Complete the frequency table.

7. 120 scores in a history test are arranged in a Frequency Distribution Table of 9 classes beginning with 12.5 - 19.5, with frequencies of 3, 10, 15, 18, 27, 20, 15, 8 and 4, from lowest to highest, respectively.

8. 100 scores in English are arranged in 9 intervals, with the lowest interval 10.5 - 17.5 and with frequencies of 1, 8, 12, 15, 23, 17, 14, 7, 3, from lowest to highest, respectively.

9. 110 scores in History are arranged in 11 intervals, the lowest 12.5 - 17.5 and with frequencies of 3, 5, 8, 12, 17, 25, 16, 11, 6, 5, 2, from lowest to highest, respectively.

10. 135 scores in Science are arranged in 11 intervals, the lowest 10.5 - 15.5 and with frequencies of 5, 7, 11, 15, 19, 30, 18, 15, 8, 5, 2, from lowest to highest, respectively.

11. 120 scores in Business are arranged in 11 intervals beginning with 12.5 - 19.5 with frequencies of 3, 6, 10, 15, 18, 26, 16, 13, [illegible], 5, from lowest to highest, respectively.

Class Boundaries	Class Mark	Tally	Frequency	Cum. Freq.	Freq. x Class Mark f·x	Dev. From Mean $\lvert x - \bar{x} \rvert$	Freq. x Dev. $f\lvert x - \bar{x} \rvert$
		TOTALS					

C.IV. STATISTICS - ANSWERS

A. 2. a) The speaker's comment was aired over radio without stating the source of the statistic. Also, the term, "children," was not defined.

b) The number of international immigrants was not stated. If 78-79 was the year when the doors were opened to Vietnamese refugees, the percentages would reflect an abnormal situation.

c) What is 95% health? How can he "give" 150%? Athletes and interviewers often make these types of meaningless statements.

d) How can it be pure (100%) and 99.4% pure at the same time? Would they consider advertising the jam as being 0.6% impure?

e) How many Buckaroos were tested? If 100 000 new vehicles were subjected to one kilometre of road test, should there be any repair?

f) Interesting statement.

g) If, of the ten doctors interviewed, seven were shareholders of the company that manufactured the placebo pills, this recommendation would be biased.

3. a) Alberta from 75-79, B.C. in 79-80

b) Ontario in 75-76, Quebec in each of the other years

c) Quebec, Alberta

d) i) Perhaps Manitoba schools should correlate subject content with the Western provinces to make it easier for a child to adjust to a new school in another province.

ii) With Manitoba experiencing a steady net loss in children, there is a decreased need for additional classroom space. Authorities should channel dollars into maintenance, repair and renovations rather than new buildings.

iii) As student enrollment drops, the demand for teachers decreases. Prospects for a teaching job in Manitoba are reduced. However, with 42 420 children moving into Alberta and 20 612 into B.C. in the years 75-80, prospects for positions in the West should be enhanced.

e) i) Fewer children mean less need for classrooms and fewer construction jobs. Immigration of children means migration of parents which results in a housing surplus, and, therefore, less demand for additional housing.

ii) The people presently working pay the pensions of the retired. An out migration of children means a smaller future labour force contributing towards pension plans. Hence, pension plan contributions per person must increase.

iii) Fewer children mean less demand for goods consumed by children (clothes, bicycles, etc.). Perhaps a manufacturer should switch from making diapers to Geritol tablets.

iv) With a net loss of students, politicians will seek more support from voters who do not have children in school. The building of schools will become less of a priority than that of building senior citizens' homes.

B. 1. Sample for b, c, d
Census for a

2. - personal interviews
- phone interviews
- open-line radio show
- mail-in responses

3. - interviewing only ministers or only grade twelve students on their opinions regarding sex and violence on T.V.

- interviewing Klu Klux Klan members on racial tolerance

- conducting a survey in the Convention Centre to determine the mean height of males on a weekend when the centre was hosting a ten-team Canadian Universities Basketball tournament

- making phone calls to residences at 2 p.m. to ask the respondent whether mothers should have full-time jobs.

4. a) With great difficulty! Are the issues economic, social? Does the ethnic background or religion of the candidate enter into the people's choice? Does the image of the candidate's spouse enter into the people's choice?

   b) The researcher should conduct his or her research to determine the areas where mousetraps may be required. The company could then flood the area with high pressure advertising and create the demand for its product.

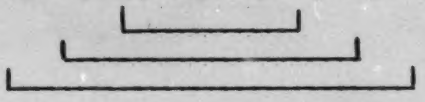
   c) The researcher could select every n^{th} name in a telephone directory of a city and phone shortly after six o'clock to obtain an opinion. If there is evidence of very strong reaction, the political party for whom the research is being carried out might be advised to delay introducing the controversial legislation until after the election.

C. 1.

	Mode	Mean	Median
a)	59	64.5	64.5
b)	62	27	24
c)	5	20.6	12
d)	23	23	23

2. a) Mean
   b) The median is affected by the number of measures but not by an extreme value.
   c) The mode is an extreme, not a central measure in a) and c).
   d) There is a "normal" distribution of values in

   12, 16, 18, 23, 23, 28, 30, 34



   For each measure below the mean, there is another value the same distance above the mean.

3. a) mode \$4.50, mean \$7.95, median \$4.75
   b) the mode \$4.50
   c) the mean \$7.95

4. None of the measures of central tendency. The bridge should be designed to carry the extreme load, which may be five trucks carrying steel on the bridge at the same time.

5. The coldest possible winter temperature must be considered.

6. In shirts, the mode is usually considered.

7. a) Range, Player #31 - 20; Player #45 - 10.

b)

	Player #31	Player #45
Mode	20	20
Mean	20	20
Median	20	20

c) One coach might insert Player #45, arguing that the player is more consistent while Player #31 blows hot and cold. Another coach might prefer Player #31, hoping for a hot streak.

8. a) 21
b) 9
c) 57.3

9. a) M.D. 26 ÷ 10 = 2.6

b) The scores of Player #45 have a mean deviation of 2.6, while the M.D. for Player #31 is 4.4. Player #45 is more consistent.

10. a) $\bar{x}$ = $49 700

$$
\begin{aligned}
|30\,000 - 49\,700| &= 19\,700 \\
|34\,000 - 49\,700| &= 15\,700 \\
|36\,000 - 49\,700| &= 13\,700 \\
|38\,000 - 49\,700| &= 11\,000 \\
|86\,000 - 49\,700| &= 36\,300 \\
|74\,200 - 49\,700| &= \underline{24\,500} \\
& 120\,900
\end{aligned}
$$

$$\text{M.D.} = \frac{120\,900}{6} = 20\,150$$

	Mean ($\bar{x}$)	M.D.
b)	10.2	7
c)	69.6	17.1
d)	36.9	7.0
e)	832.2	736.1
f)	6.4	0.8
g)	$15 966.67	$2466.67
h)	7786.7 kg	1417.8 kg
i)	175.7 cm	5.4 cm
j)	76.1%	11.1%
k)	140.1	10.2

II. Medians

a) 37 000
b) 8
c) 72
d) 34
e) 472
f) 6.4

GROUPED DATA

MASS GRADE XII STUDENTS

1.
a)b)

f	x•f	Cumulative Frequency
2	40x2 80	2
2	90	4
8	400	12
16	880	28
18	1080	46
14	910	60
12	840	72
6	450	78
6	480	84
4	340	88
1	90	89

2.

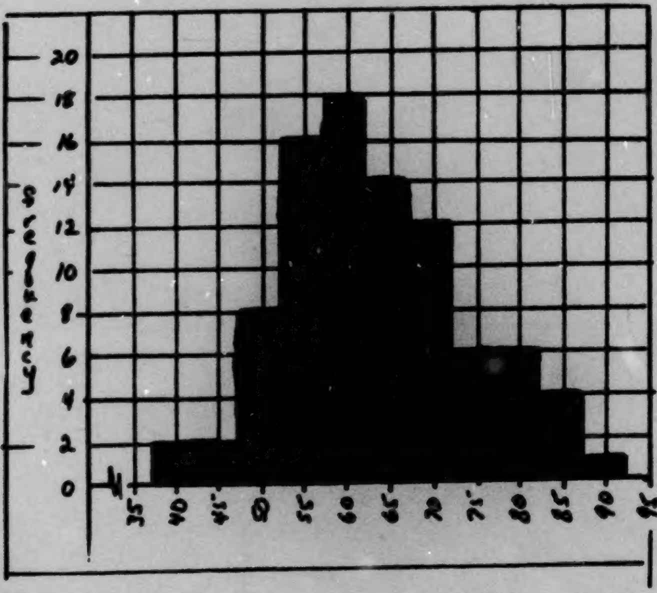
ANNUAL BASKETBALL FREE THROW

Class Boundaries	Class Mark x	Tally	Frequency f	Class Mark Times Frequency x.f	Cumulative Totals
52.5 - 57.5	55	|||	3	165	3
57.5 - 62.5	60	𝍸 |	6	360	9
62.5 - 67.5	65	𝍸 𝍸	10	650	19
67.5 - 72.5	70	𝍸 𝍸 𝍸 ||||	19	1330	38
72.5 - 72.5	75	𝍸 𝍸 𝍸 ||	17	1275	55
77.5 - 82.5	80	𝍸 𝍸	10	800	65
82.5 - 87.5	85	𝍸 |||	8	680	73
87.5 - 92.5	90	|||	3	270	76
92.5 - 97.5	95	|	1	95	77
			77	5625	

3. HEIGHTS OF DENZIL DIESEL EMPLOYEES

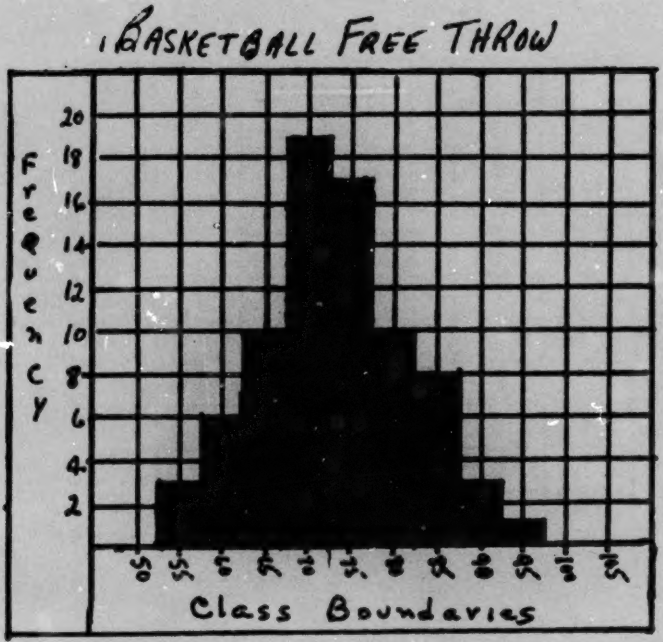
Class Boundaries	Class Mark x	Tally	Frequency f	f•x	Cumulative Frequency
148.5 - 155.5	152	III	3	456	3
155.5 - 162.5	159	III	3	477	6
162.5 - 169.5	166	𝍸 IIII	9	1494	15
169.5 - 176.5	173	𝍸 III	8	1384	23
176.5 - 183.5	180	𝍸 IIII	9	1620	32
183.5 - 190.5	187	𝍸 II	7	1309	39
190.5 - 197.5	194	𝍸 II	7	1358	46
197.5 - 204.5	201	IIII	4	804	50
			50	8902	

6. HISTOGRAM MASS OF GRADE XII STUDENTS

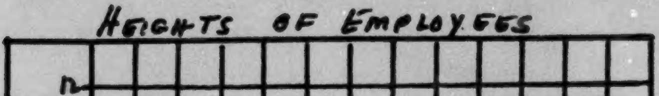


BEST COPY

7.

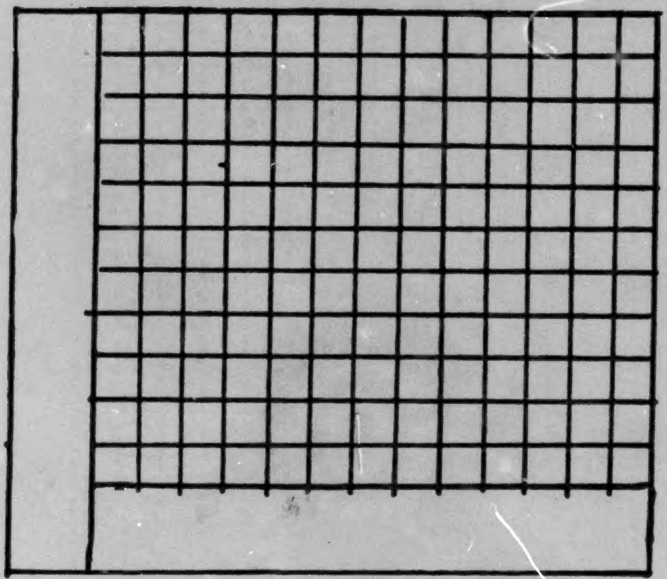

BASKETBALL FREE THROW
Frequency
20
18
16
14
12
10
8
6
4
2
Class Boundaries

8.


HEIGHTS OF EMPLOYEES
Frequency
12
11
10
9
8
7
6
5
4
3
2
1
Class Boundaries

9.

END DIGITS OF SALES PRICES



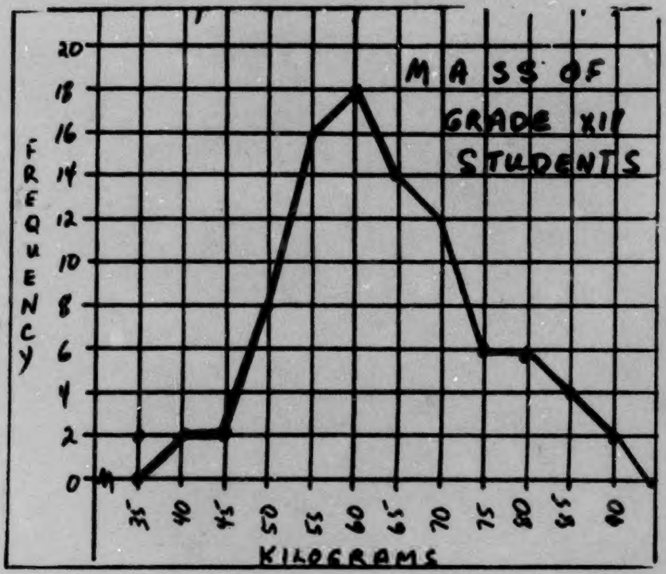
Answers will vary.

10.

PRICES – THREE YEAR OLD CARS

Answers will vary.

11. FREQUENCY POLYGON



12. a) Cumulative frequency - see previous tables.

b)

	D1 Mass of Grade XII Students	D2 B.B. Free Throws	D3 Denzil Diesel
Mode	60	70	166 and 180*
Mean	$5640 \div 89 = 63.4$	$5625 \div 77 = 73.1$	$8902 \div 50 = \underline{178}$
Median	$\frac{17}{18} \times 5 + 57.5 = 62.2$	$\frac{1}{17} \times 5 + 72.5 = 72.8$	$\frac{2.5}{9} \times 7 + 176.5 = \underline{178.4}$

* Notice the bimodal distribution indicating two subsets within the set.

The mode of 180 cm is the mode for the males and the 166 cm may be the mode for the females.

13. Range 90 - 40 = 50

BEST COPY

14. Hours of Bulb Life

Class Mark Hours	Frequency f	Deviation from the Mean $\lvert\bar{x} - x\rvert$	Deviation from the Mean times Frequency $f \cdot \lvert\bar{x} - x\rvert$
970	1	$\lvert 891 - 970\rvert = 79$	79
950	2	$\lvert 891 - 950\rvert = 59$	118
930	2	$\lvert 891 - 930\rvert = 39$	78
910	3	$\lvert 891 - 930\rvert = 19$	57
890	7	$\lvert 891 - 890\rvert = 1$	7
870	6	$\lvert 891 - 870\rvert = 21$	126
850	3	$\lvert 891 - 850\rvert = 41$	124
830	0	$\lvert 891 - 830\rvert = 61$	0
810	1	$\lvert 891 - 810\rvert = 81$	81
	25		670

$$\text{M.D.} \doteq \frac{\Sigma f\,\lvert\bar{x} - x\rvert}{N} = \frac{670}{25} = \underline{\underline{26.8}}$$

15. The mean deviation for the heights of the employees of the Denzil Diesel Company in problem D.3:

Class Mark	Frequency f	Deviation from the Mean $\lvert\bar{x} - x\rvert$	Deviation from the Mean times Frequency $f \cdot \lvert\bar{x} - x\rvert$
152	3	$\lvert 179 - 152\rvert = 26$	78
159	3	$\lvert 178 - 159\rvert = 19$	57
166	9	$\lvert 178 - 166\rvert = 12$	108
173	8	$\lvert 178 - 173\rvert = 5$	40
180	9	$\lvert 178 - 180\rvert = 2$	18
187	7	$\lvert 178 - 187\rvert = 9$	63
194	7	$\lvert 178 - 194\rvert = 16$	112
201	4	$\lvert 178 - 201\rvert = 23$	92
	50		568

$$\text{M.D.} = \frac{\Sigma f\,\lvert x - x\rvert}{N} = \frac{568}{50} = \underline{\underline{11.4}}$$

E. PERCENTILES

1. Mechanical Reasoning
2. 40%
3. Language usage
4. a) The sciences such as Geometry, Physics and Chemistry

   b) Subjects in which essays are required
5. In seeing his aptitude profile, the student can make a more intelligent decision in choosing his courses, whether Maths 100 or 101 or Physics 200 vs Accounting 202.
6. Student A might consider any field requiring mechanical reasoning and mathematics such as the technologies at the community college: eg., computer, machinist, drafting.
7. The results are never "accurate." The student might score differently on the same test on consecutive days but the indication of areas of aptitude should be the same. Results can be affected by a late night, illness, mood, etc.
8. 10%
9. Perhaps Geometry, Physics and the trade areas
10. The overall profile shows much strength in areas related to the writing field, although there seems to be a weakness in grammar which could be overcome.

Note: Both students are highly intelligent and had a mean average in the high 80's in grade ten. Student A is male and was raised on a farm with early exposure to machines. His strong areas are maths and science but his handwriting is poor. He loves motorcycles and plays guitar.

Student B is a female. Her essays and projects are very neat, well organized and elaborate. She specializes in track events. She plans to go into nursing.

Review Exercises

A. 1. Heights of Blue Bomber Players

Class Boundaries	Class Mark	Tally	Frequency	Cum. Freq.	Freq. x Class Mark $f \cdot x$	Dev. From Mean $\lvert\bar{x} - x\rvert$	Freq. x Dev. $f\lvert\bar{x} - \bar{x}\rvert$
167.5-172.5	170	//	2	2	340	$\lvert 187.6-170\rvert = 17.6$	35.2
172.5-177.5	175						
177.5-182.5	180	卌 /	6	8	1080	$\lvert 187.6-180\rvert = 7.6$	45.8
182.5-187.5	185	卌 卌 ///	13	21	2405	$\lvert 187.6-185\rvert = 2.6$	33.6
187.5-192.5	190	卌 卌 ////	14	35	2660	$\lvert 187.6-190\rvert = 2.4$	33.6
192.5-197.5	195	卌 /	6	41	1170	$\lvert 187.6-195\rvert = 7.4$	44.4
197.5-202.5	200	///	3	44	600	$\lvert 187.6-200\rvert = 12.4$	37.2
			44		8255		229.8

$$\bar{x} = \frac{8255}{44} = 187.6$$

$\boxed{\text{Mean} = 187.6}$

Md- is the 22.5 th number and is in 5th class.

$$\text{Md} = 187.5 + \frac{5 \times 1.5}{14} = 187.5 + 0.54$$

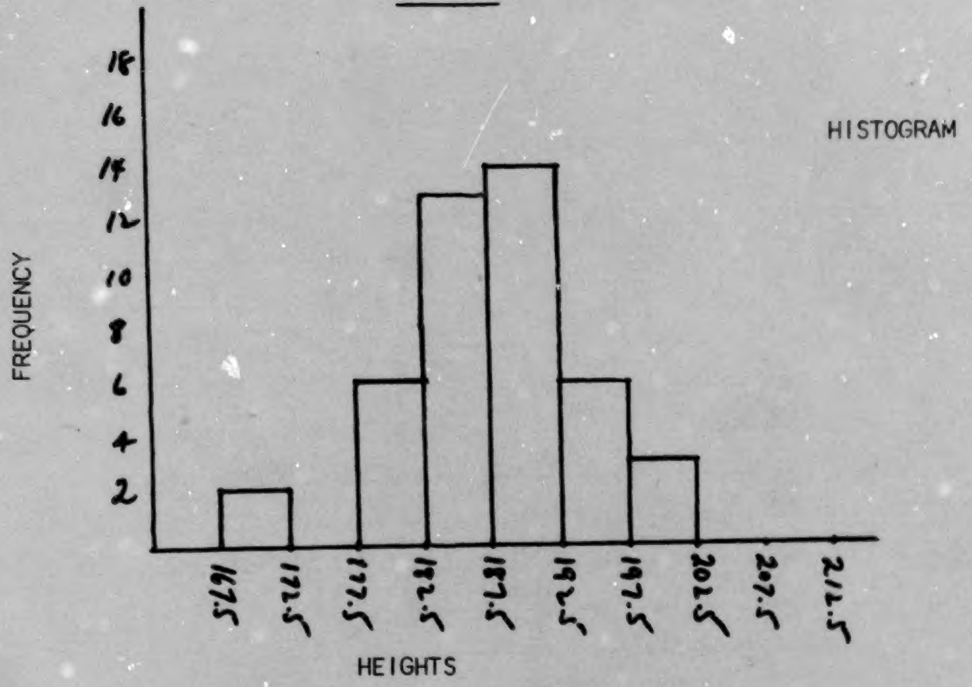
$\boxed{\text{Median} = 188.04}$

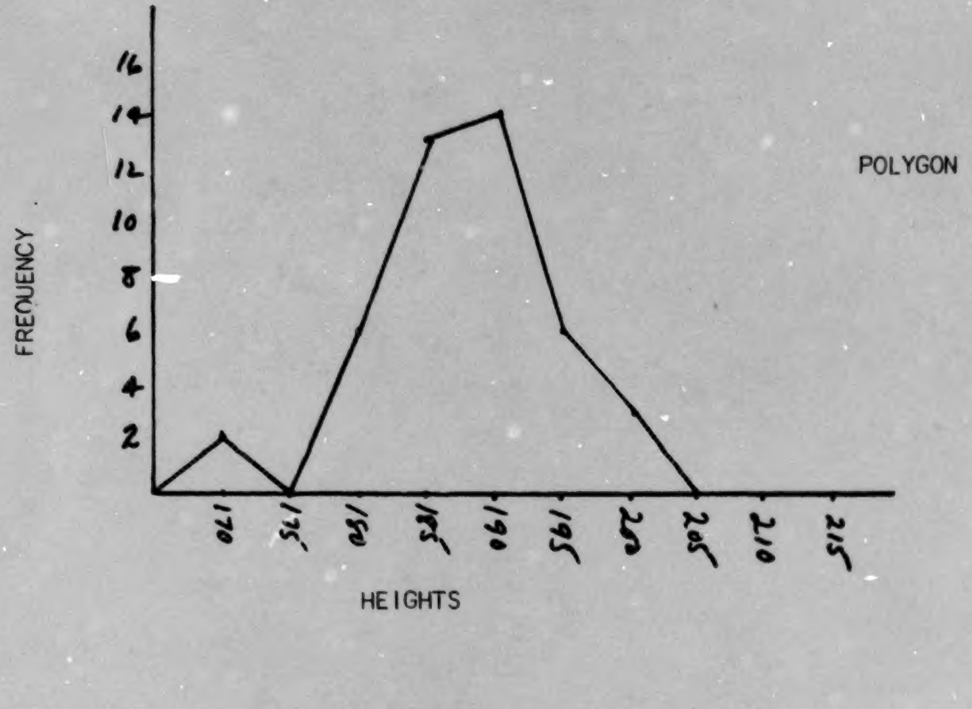
$\boxed{\text{Mode} = 190}$

$$\text{M.D.} = \frac{229.8}{44} = 5.2$$

$\boxed{\text{Mean Deviation} = 5.2}$

HEIGHTS


HISTOGRAM
FREQUENCY
18
16
14
12
10
8
6
4
2
167.5
172.5
177.5
182.5
187.5
192.5
197.5
202.5
207.5
212.5
HEIGHTS


POLYGON
FREQUENCY
16
14
12
10
8
6
4
2
170
175
180
185
190
195
200
205
210
215
HEIGHTS

Weights of Blue Bomber Players

Class Boundaries	Class Mark	Tally	Frequency	Cum. Freq.	Freq. x Class Mark $f \cdot x$	Dev. From Mean $\lvert\bar{x} - x\rvert$	Freq. x Dev. $f\lvert\bar{x} - \bar{x}\rvert$
81.5-87.5	84.5	𝍸𝍸𝍸	15	15	1267.5	98.3 - 84.5 = 13.8	207.0
87.5-93.5	90.5	𝍸 ///	8	23	724.0	98.3 - 90.5 = 7.8	62.4
93.5-99.5	96.5	///	3	26	289.5	98.3 - 96.5 = 1.8	5.4
99.5-105.5	102.5	////	4	30	410.0	98.3 - 102.5 = 4.2	16.8
105.5-111.5	108.5	𝍸	5	35	542.5	98.3 - 108.5 = 10.2	50.0
111.5-117.5	114.5	///	3	38	343.5	98.3 - 114.5 = 16.2	48.6
117.5-123.5	120.5	///	3	41	361.5	98.3 - 120.5 = 22.2	66.6
123.5-129.5	126.5	//	2	43	253.0	98.3 - 126.5 = 28.2	56.4
129.5-135.5	132.5	/	1	44	132.5	98.3 - 132.5 = 34.2	34.2
			44		4324.0		547.4

$$\bar{x} = \frac{4324}{44} = 98.3$$

$\boxed{\text{Mean} = 98.3}$

Md- is the 22.5th number and is in the 2nd class.

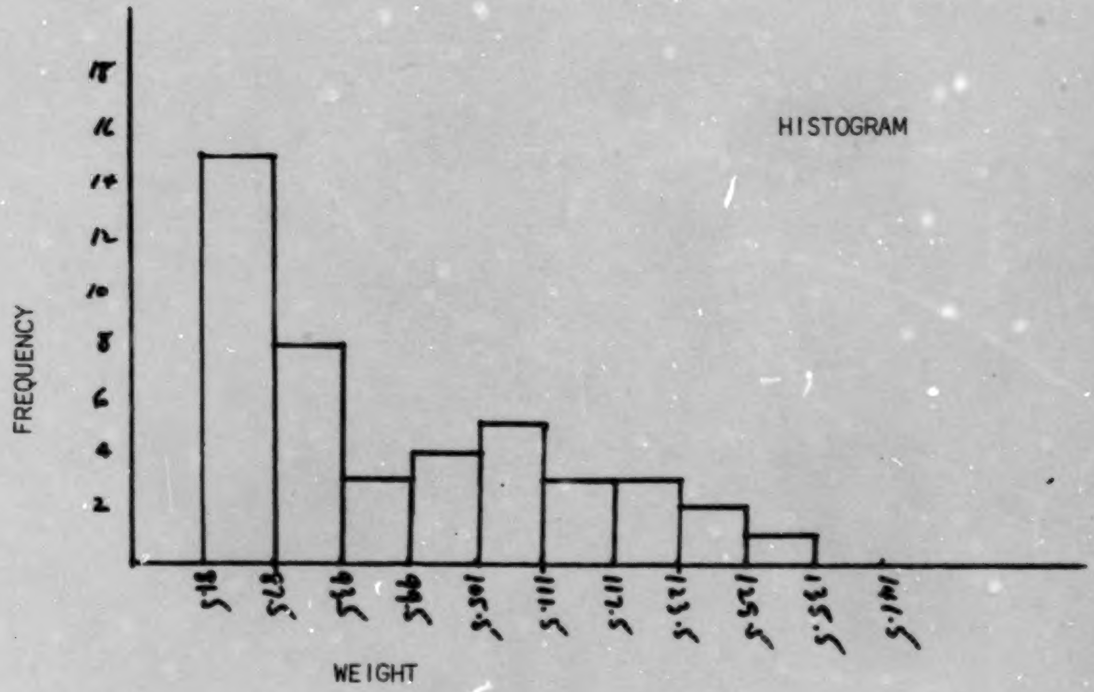
$$\text{Md} = 87.5 + \frac{6 \times 6}{8} = 87.5 + 4.5$$

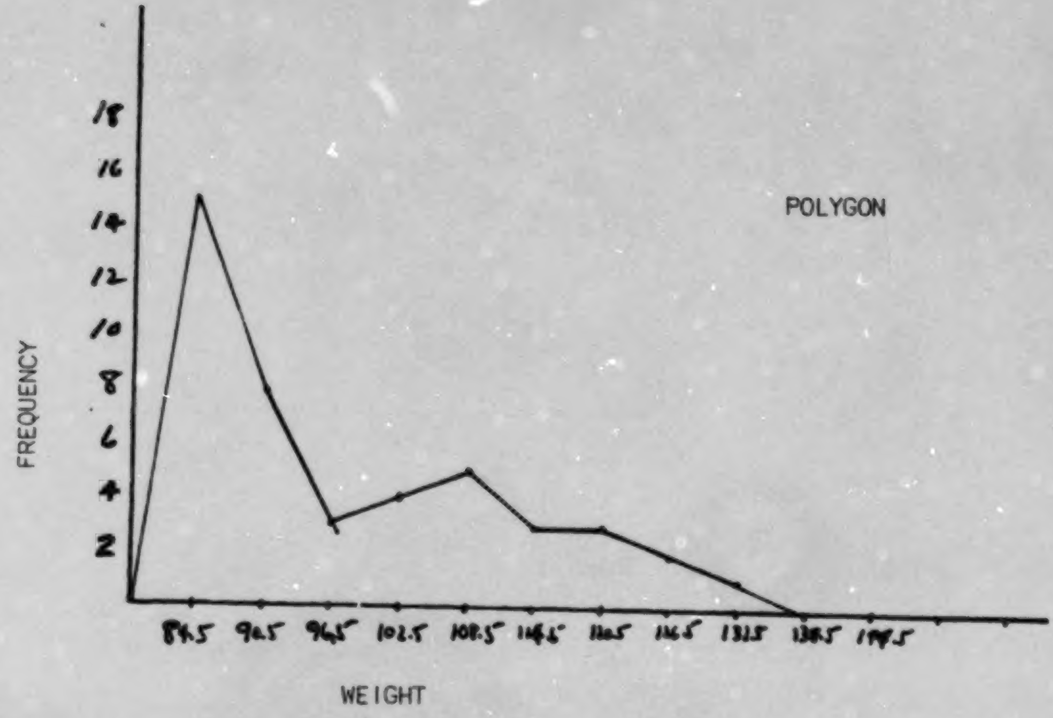
$\boxed{\text{Median} = 92}$ $\boxed{\text{Mode} = 84.5}$

$$\text{M.D.} = \frac{547.4}{44} = 12.4$$

$\boxed{\text{Mean Deviation} = 12.4}$

WEIGHTS


HISTOGRAM
FREQUENCY
18
16
14
12
10
8
6
4
2
WEIGHT
81.5
87.5
93.5
99.5
105.5
111.5
117.5
123.5
129.5
135.5
141.5


POLYGON
FREQUENCY
18
16
14
12
10
8
6
4
2
WEIGHT
84.5
90.5
96.5
102.5
108.5
114.5
120.5
126.5
132.5
138.5
144.5

B. 1.

Class Boundaries	Class Marks (x)	Tally	Frequency (f)	Cum. Freq.	x·f
22.5 - 35.5	29	|||	3	3	87
35.5 - 48.5	42	[illegible]	14	17	588
48.5 - 61.5	55	[illegible]	11	28	605
61.5 - 74.5	68	[illegible]	17	45	1156
74.5 - 87.5	81	[illegible]	10	55	810
87.5 -100.5	94	[illegible]	5	60	470
		TOTAL	60		3716

$\overline{x} = \frac{3716}{60} = 61.93$

$\boxed{\text{Mean} = 61.93}$

30.5th term is in class 4.

$Md = 61.5 + \frac{2.5}{17}(13) = 61.5 + 1.9 = 63.4$

$\boxed{Md = 63.4}$

2.

Class Boundaries	Class Marks	Tally	Frequency	Cum. Freq.	x•f
34.5 - 39.5	37	//	2	2	74
39.5 - 44.5	42	卌 卌 //	12	14	504
44.5 - 49.5	47	卌 卌 卌 卌	20	34	940
49.5 - 54.5	52	卌 /	6	40	312
54.5 - 59.5	57	卌	5	45	385
59.5 - 64.5	62	//	2	47	124
64.5 - 69.5	67	//	2	49	134
69.5 - 74.5	72	/	1	50	72
		TOTAL	50		2445

1.

$$\bar{x} = \frac{\Sigma\, x.f}{\Sigma f} = \frac{2445}{50}$$

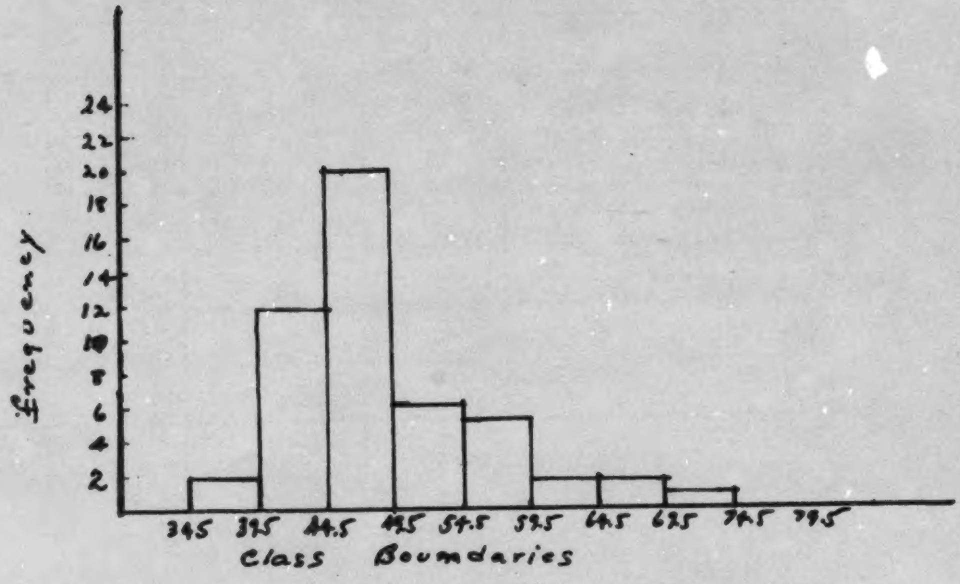
$\boxed{\text{Mean} = 48.9}$

Md = 25.5th term and is in the 3rd class.

$$\text{Md} = 44.5 + \frac{11.5}{20}(5) = 44.5 + 2.9 = 47.4$$

$\boxed{\text{Median} = 47.4}$

2.


Frequency
24
22
20
18
16
14
12
10
8
6
4
2
34.5
39.5
44.5
49.5
54.5
59.5
64.5
69.5
74.5
79.5
Class Boundaries

3.

Class Boundaries	Class Marks (x)	Tally	Frequency f	Cumulative Frequency	x·f
17.5-21.5	19.5	////	4	4	78.0
21.5-25.5	23.5	//	2	6	47.0
25.5-29.5	27.5	𝍸 𝍸 ////	14	20	385.0
29.5-33.5	31.5	𝍸 //	7	27	220.5
33.5-37.5	35.5	𝍸 ///	8	35	284.0
37.5-41.5	39.5	𝍸 𝍸 ///	13	48	513.5
41.5-45.5	43.5	///	3	51	130.5
45.5-49.5	47.5	𝍸 𝍸	10	61	475.0
			61		2133.5

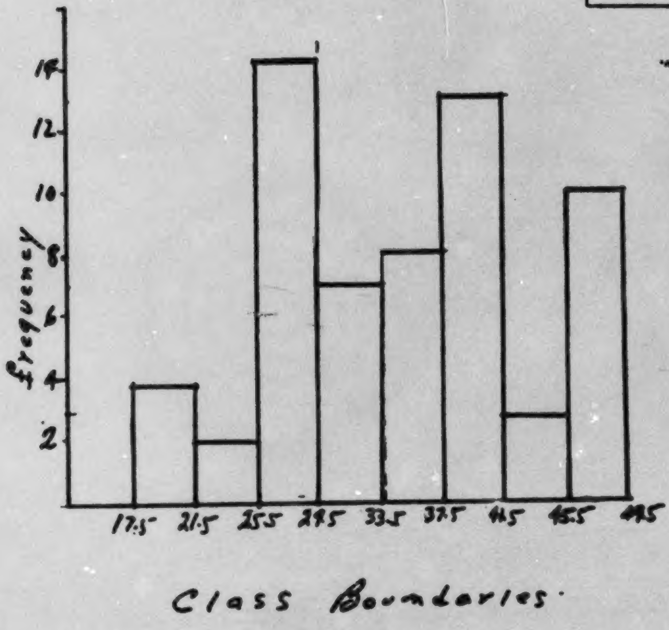
$$x = \frac{\Sigma\, x \cdot f}{\Sigma f} = \frac{2133.5}{61} = 34.9$$

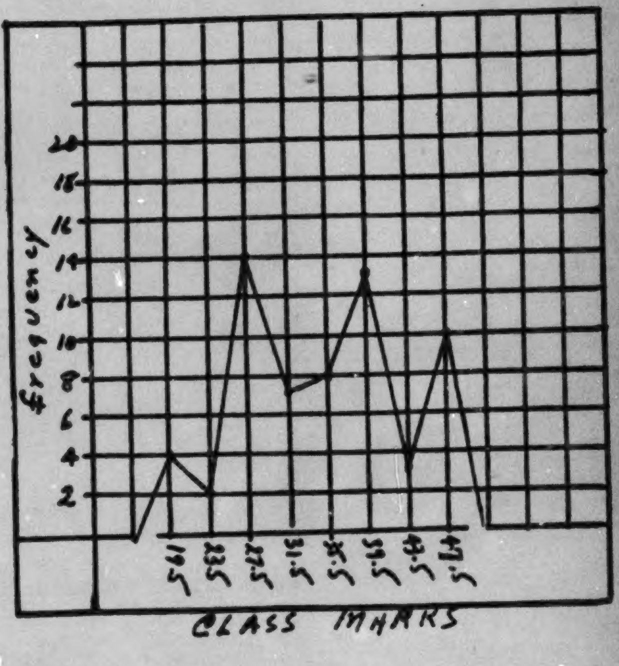
Mean = 34.9

Md = 31st term and is in class 5

$$Md = 33.5 + \frac{4 \times 4}{8} = 35.5$$

Median = 35.5





4.

Class Boundaries	Class Marks (x)	Tally	Frequency (f)	Cumulative Frequency	x•f
12.5-23.5	18	/	1	1	18
23.5-34.5	29	/	1	2	29
34.-45.5	40	卌 ||	7	9	280
45.5-56.5	51	卌 卌 |||	13	22	663
56.5-67.5	62	卌 卌 卌 卌 卌 卌 ||	32	54	1984
67.5-78.5	73	卌 卌 卌 卌 |	21	75	1533
78.5-89.5	84	卌 卌 卌	15	90	1260
89.5-100.5	95	卌 |||	8	98	760
100.5-111.5	106	/	1	99	106
111.5-122.5	117	/	1	100	117
		TOTALS ⟶	100		6750

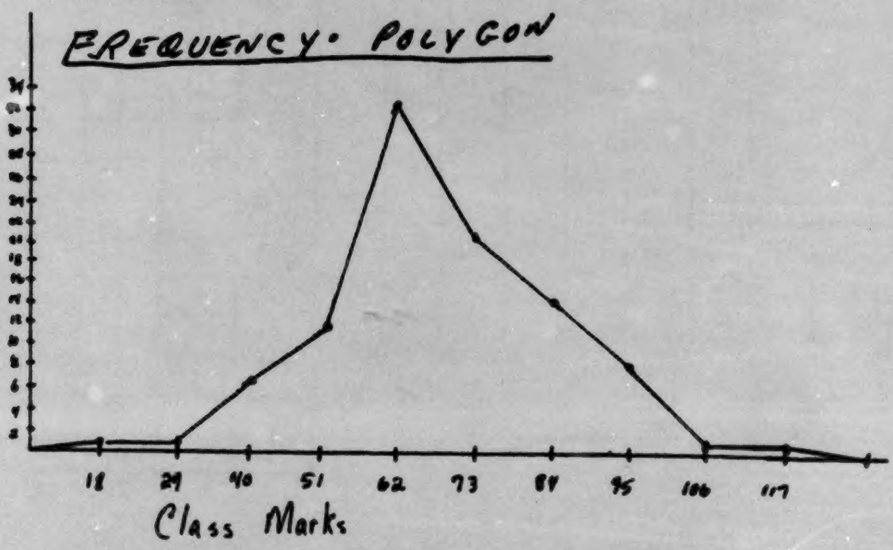
$\overline{x} = \frac{\Sigma x \cdot f}{\Sigma f} = \frac{6750}{100} = 67.5$

Md - is 50.5th term and is in class 5.

$Md = 56.5 + \frac{28.5(11)}{32} = 66.3$

$\boxed{\text{Mean} = 67.5}$

$\boxed{\text{Median} = 66.3}$



5.

Class Boundaries	Class Marks (x)	Tally	Frequency (f)	Cumulative Frequency	x•f
41.5-50.5	46	𝍸 𝍸	10	10	460
50.5-59.5	55	𝍸 |||	8	18	440
59.5-68.5	64	𝍸 ||||	9	27	576
68.5-77.5	73	𝍸 𝍸 |||	13	40	949
77.5-86.5	82	𝍸 𝍸 ||||	14	54	1148
86.5-95.5	91	𝍸 |	6	60	546
		TOTALS ⟶	60		4199

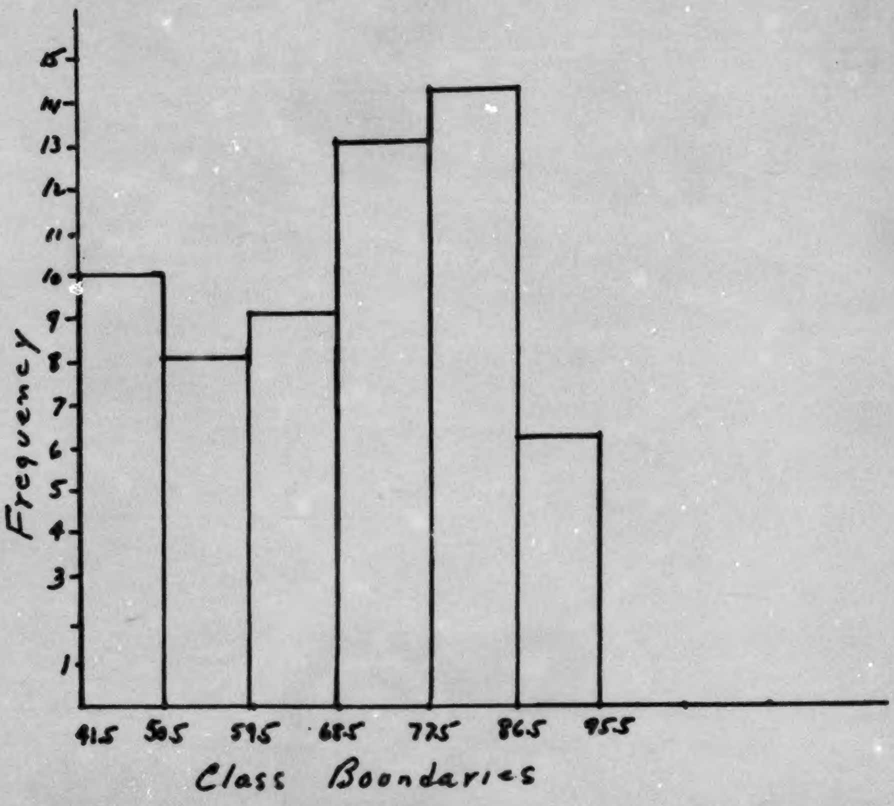
$$\bar{x} = \frac{\Sigma\, x\cdot f}{\Sigma f} = \frac{4199}{60} = 68.65$$

$$\boxed{\text{Mean} = 68.7}$$

Md is the 30.5th number and is in the 4th class

$$\text{Md} = 68.5 + \frac{3.5\times 9}{13} = 70.9$$

$$\boxed{\text{Median} = 70.9}$$



6.

Class Boundaries	Class Marks (x)	Frequency (f)	Cumulative Frequency	x•f
21.5-28.5	25	3	3	75
28.5-35.5	32	5	8	160
35.5-42.5	39	8	16	312
42.5-49.5	46	6	22	276
	TOTALS ⟶	22		823

$\overline{x} = \frac{823}{22} = 37.4$

$\boxed{\text{Mean} = 37.4}$

Md - is the 11.5th number and is 3.5 into the 3rd class.

$$\text{Md} = 35.5 + \frac{3.5 \times 7}{16}$$

$$= 35.5 + 1.5$$

$\boxed{\text{Median} = 37.0}$

7.

Class Boundaries	Class Marks (x)	Frequency (f)	Cumulative Frequency	x·f
13.5-28.5	21	1	1	21
28.5-43.5	36	3	4	108
43.5-58.5	51	11	15	561
58.5-73.5	66	2	17	132
73.5-88.5	81	12	29	972
88.5-103.5	96	2	31	192
	TOTALS⟶	31		1986

$\bar{x} = \frac{1986}{31} = 64.1$

$\boxed{\text{Mean} = 64.1}$

Md - is the 16th number and is in the 4th class.

$Md = 58.5 + \frac{1 \times 15}{2} = 58.5 + 7.5 = 66.0$

$\boxed{\text{Median} = 66.0}$

8.

Class Boundaries	Class Mark	Tally	Frequency	Cum. Freq.	Freq.x Class Mark $f \cdot x$
15.5-22.5	19	/	1	1	19
22.5-29.5	26	///	3	4	78
29.5-36.5	33	////	4	8	132
36.5-43.5	40	卌	5	13	200
43.5-50.5	47	卌	6	19	282
50.5-57.5	54	卌 //	7	26	378
57.5-64.5	61	卌 卌 卌 卌 卌	25	51	1525
64.5-71.5	68	卌 卌 卌 卌 //	22	73	1496
71.5-78.5	75	卌 卌 /	11	84	825
78.5-85.5	82	卌 ////	9	93	738
85.5-92.5	89	卌	5	98	445
92.5-99.5	96	//	2	100	198
			100		6316

$\overline{x} = \frac{6316}{100} = 63.2$

Mean = 63.2

Md = 50.5th number and is in 7th class.

$Md = 57.5 + \frac{24.5 \times 7}{25} = 64.4$

Median = 64.4

C. 1.

Class Boundaries	Class Mark	Tally	Frequency	Cum. Freq.	Freq.x Class Mark f·x	Dev. From Mean $\lvert\bar{x} - x\rvert$	Freq. x Dev. $f\lvert\bar{x} - x\rvert$
45.5-50.5	48		4	4	192	60.5-48 = 12.5	50.0
50.5-55.5	53		6	10	318	60.5-53 = 7.5	45.0
55.5-60.5	58		14	24	812	60.5-58 = 2.5	35.0
60.5-65.5	63		16	40	1008	60.5-63 = 2.5	40.0
65.5-70.5	68		7	47	476	60.5-68 = 7.5	52.5
70.5-75.5	73		3	50	219	60.5-73 = 12.5	37.5
			50		3025		260.0

$$\bar{x} = \frac{3025}{50} = 60.5$$

$$\boxed{\text{Mean} = 60.5}$$

Md - is the 25.5th term and is in class 4

$$Md = 60.5 + \frac{5\times 1.5}{16}$$

$$= 61.0$$

$$\boxed{\text{Median} = 61.0}$$

$$M.D. = \frac{260}{50} = 5.2$$

$$\boxed{\text{Mean Deviation} = 5.2}$$

2,

Class Boundaries	Class Marks (x)	f	f•x	$\lvert x-\bar{x}\rvert$	$f\cdot\lvert x-\bar{x}\rvert$
13.5-16.5	15	2	30	11.5	23
16.5-19.5	18	5	90	8.5	42.5
19.5-22.5	21	7	147	5.5	38.5
22.5-25.5	24	10	240	2.5	25.0
25.5-28.5	27	15	405	0.5	7.5
28.5-31.5	30	11	330	3.5	38.5
31.5-34.5	33	6	198	6.5	39.0
34.5-37.5	36	3	108	9.5	28.5
37.5-40.5	39	1	39	12.5	12.5
	TOTALS ⟶	60	1587	60.5	255.0

$$\bar{x} = \frac{1587}{60}$$

Mean = 26.5

Md - is the 30.5th number and is in class 5.

$$Md = 25.5 + \frac{3\times 6.5}{15} = 25.5 + 1.3$$

$$= 26.8$$

Median = 26.8

$$M.D. = \frac{\Sigma f \cdot |x-\bar{x}|}{N}$$

$$= \frac{255}{60}$$

Mean Deviation = 42.5

3.

Class Boundaries	Class Marks (x)	f	Cum. f	f•x	$\lvert x-\bar{x}\rvert$	$f\cdot\lvert x-\bar{x}\rvert$
5.5-10.5	8	1	1	8	21.2	21.2
10.5-15.5	13	3	4	39	16.2	48.6
15.5-20.5	18	5	9	90	11.2	56.0
20.5-25.5	23	9	18	207	6.2	55.8
25.5-30.5	28	15	33	420	1.2	18.0
30.5-35.5	33	16	49	528	3.8	60.8
35.5-40.5	38	5	54	190	8.8	44.0
40.5-45.5	43	4	58	172	13.8	55.2
45.5-50.5	48	2	60	96	18.8	37.6
	TOTALS ⟶	60		1750		397.2

$$\bar{x} = \frac{1750}{60} = 29.2$$

$$\boxed{\text{Mean} = 29.2}$$

Med. is the 30.5th number and is in class 5.

$$Md = 25.5 + \frac{5\times 12.5}{15} = 25.5 + 4.2$$

$$\boxed{\text{Median} = 29.7}$$

$$\text{M.D.} = \frac{397.2}{60} = 6.6$$

$$\boxed{\text{Mean Deviation} = 6.6}$$

4.

Class Boundaries	Class Marks (x)	Tally	f	Cum. f	$f(x)$	$\lvert x-\bar{x}\rvert$	$f\,\lvert x-\bar{x}\rvert$
22.5-32.5	27.5		1	1	27.5	37.3	37.3
32.5-42.5	37.5		2	3	75.0	27.3	54.6
42.5-52.5	47.5		4	7	190.0	17.3	69.2
52.5-62.5	57.5		4	11	230.0	7.3	29.2
62.5-72.5	67.5		9	20	607.5	2.7	24.3
72.5-82.5	77.5		6	26	465.0	12.7	76.2
82.5-92.5	87.5		4	30	350.0	22.7	90.8
		TOTALS →	30		1945.0		381.6

$$\bar{x} = \frac{1945.0}{30} = 64.8$$

Mean = 64.8

Md - 15.5th number and is in class 5.

$$Md = 62.5 + \frac{5\times 4.5}{9}$$

$$= 62.5 + 2.5$$

$$Md = 65.0$$

Median = 65.0

$$M.D. = \frac{381.6}{30} = 12.7$$

Mean Deviation = 12.7

5.

Class Boundaries	Class Mark		f	Cum. f	f·x	$\lvert x-\bar{x}\rvert$	$f\cdot\lvert x-\bar{x}\rvert$
9.5-20.5	15		2	2	30.0	47.1	94.2
20.5-31.5	26		5	7	130.0	36.7	180.5
31.5-42.5	37		8	15	296.0	25.1	200.8
42.5-53.5	48		10	25	480.0	14.1	141.0
53.5-64.5	59		14	39	826.0	3.1	43.4
64.5-75.5	70		15	54	1050.0	7.9	118.5
75.5-86.5	81		11	65	891.0	18.9	207.9
86.5-97.5	92		7	72	644.0	29.9	209.3
97.5-108.5	103		3	75	309.0	40.9	122.7
		TOTALS	75		4656.0		1318.3

$\bar{x} = \frac{4656}{75} = 62.1$

$\boxed{\text{Mean} = 62.1}$

Md - is 38th number and is class 5.

$$\text{Md} = 53.5 + \frac{13\times 11}{14}$$

$$= 53.5 + 10.2$$

$$= 63.7$$

$\boxed{\text{Median} = 63.7}$

$\text{M.D.} = \frac{1318.3}{75} = 17.6$

$\boxed{\text{Mean Deviation} = 17.6}$

6.

Class Boundaries	Class Mark x	Tally	Frequency	Cum. Freq.	Freq. x Class Mark $f \cdot x$	Dev. From Mean $\lvert x - \bar{x} \rvert$	Freq. x Dev. $f \lvert x - \bar{x} \rvert$
15.5-20.5	18		2	2	36	20.25	40.50
20.5-25.5	23		8	10	184	15.25	122.00
25.5-30.5	28		11	21	308	10.25	112.75
30.5-35.5	33		17	38	561	5.25	89.25
35.5-40.5	38		21	59	798	0.25	5.25
40.5-45.5	43		19	78	817	4.75	90.25
45.5-50.5	48		12	90	576	9.75	117.00
50.5-55.5	53		7	97	371	14.75	103.25
55.5-60.5	58		3	100	174	19.75	59.25
		TOTALS	100		3825		739.5

$$\bar{x} = \frac{3825}{100} = 38.25$$

$$\boxed{\text{Mean} = 38.25}$$

Md - the 50.5th number and is in class 5.

$$Md = 35.5 + \frac{5 \times 12.5}{21}$$

$$= 35.5 + 3.0$$

$$\boxed{\text{Median} = 38.5}$$

$$M.D. = \frac{739.5}{100} = 7.40$$

$$\boxed{\text{Mean Deviation} = 7.4}$$

7.

Class Boundaries	Class Mark x	Tally	Frequency	Cum. Freq.	Freq.x Class Mark $f \cdot x$	Dev. From Mean $\lvert x - \bar{x} \rvert$	Freq. x Dev. $f\lvert x - \bar{x} \rvert$
12.5-19.5	16		3	3	48.	28	84
19.5-26.5	23		10	13	230.	21	210
26.5-33.5	30		15	28	450.	14	210
33.5-40.5	37		18	46	666.	7	126
40.5-47.5	44		27	73	1188.	0	0
47.5-54.5	51		20	93	1020.	7	140
54.5-61.5	58		15	108	870.	14	210
61.5-68.5	65		8	116	520.	21	168
68.5-75.5	72		4	120	288.	28	112
		TOTALS →	120		5280.		1260

$$\bar{x} = \frac{5280}{120} = 44.0$$

$$\boxed{\text{Mean} = 44.0}$$

Md - is the 60.5th number and is in class 5.

$$\text{Md} = 40.5 + \frac{7 \times 4.5}{27}$$

$$= 40.5 + 1.7$$

$$= 42.2$$

$$\boxed{\text{Median} = 42.2}$$

$$\text{M.D.} = \frac{1260}{120} = 10.5$$

$$\boxed{\text{Mean Deviation} = 10.5}$$

8.

Class Boundaries	Class Mark	Tally	Fre-quency	Cum. Freq.	Freq. x Class Mark f·x	Dev. From Mean |x - x|	Freq. x Dev. f|x - x|
10.5-17.5	14		1	1	14	28.8	28.8
17.5-24.5	21		8	9	168	21.8	174.4
24.5-31.5	28		12	21	336	14.8	177.6
31.5-38.5	35		15	36	525	7.8	117.0
38.5-45.5	42		23	59	966	0.8	18.4
45.5-52.5	49		17	76	833	6.2	105.4
52.5-59.5	56		14	90	784	13.2	184.8
59.5-66.5	63		7	97	441	20.2	141.4
66.5-73.5	70		3	100	210	27.2	81.6
		TOTALS→	100		4277		1029.4

$$\bar{x} = \frac{4277}{100} = 42.8$$

$$\boxed{\text{Mean} = 42.8}$$

Md - is the 50.5th number and is in class 5

$$\text{Md} = 38.5 + \frac{14.5\text{x}7}{23}$$

$$\text{Median} = 38.5 + 4.4$$

$$\boxed{\text{Median} = 42.9}$$

$$\text{M.D.} = \frac{1029.4}{100} = 10.3$$

$$\boxed{\text{Mean Deviation} = 10.3}$$

9.

Class Boundaries	Class Mark	Tally	Frequency	Cum. Freq.	Freq. x Class Mark $f \cdot x$	Dev. From Mean $\lvert x - \overline{x} \rvert$	Freq. x Dev. $f\lvert x - \overline{x} \rvert$
12.5-17.5	15		3	3	45	24.4	73.2
17.5-22.5	20		5	8	100	19.4	97.0
22.5-27.5	25		8	16	200	14.4	115.2
27.5-32.5	30		12	28	360	9.4	112.8
32.5-37.5	35		17	45	595	4.4	74.8
37.5-42.5	40		25	70	1000	0.6	15.0
42.5-47.5	45		16	86	720	5.6	89.6
47.5-52.5	50		11	97	550	10.6	116.6
52.5-57.5	55		6	103	330	15.6	93.6
57.5-62.5	60		5	108	300	20.6	103.0
62.5-67.5	65		2	110	130	25.6	51.2
				TOTALS	4330		942.0

$\overline{x} = \frac{4330}{110} = 39.4$

$\boxed{\text{Mean} = 39.4}$

Md - the 55.5th number and is in class 6

$\text{Md} = 37.5 + \frac{10.5}{25} \times 5$

$= 37.5 + 2.1$

$\boxed{\text{Median} = 39.6}$

$\text{M.D.} = \frac{942}{110} = 8.6$

$\boxed{\text{Mean Deviation} = 8.6}$

10.

Class Bounderies	Class Mark	Tally	Fre- quency	Cum. Freq.	Freq. x Class Mark $f \cdot x$	Dev. From Mean $\lvert x - \bar{x} \rvert$	Freq. x Dev. $f \lvert x - \bar{x} \rvert$
10.5-15.5	13		5	5	65	23.8	119.0
15.5-20.5	18		7	12	126	18.8	131.6
20.5-25.5	23		11	23	253	13.8	151.8
25.5-30.5	28		15	38	420	8.8	132.0
30.5-35.5	33		19	57	627	3.8	72.2
35.5-40.5	38		30	87	1140	1.2	36.0
40.5-45.5	43		18	105	774	6.2	111.6
45.5-50.5	48		15	120	720	11.2	168.0
50.5-55.5	53		8	128	424	16.2	129.6
55.5-60.5	58		5	133	290	21.2	106.0
60.5-65.5	63		2	135	126	26.2	52.4
		TOTALS	135		4965		1210.2

$$\bar{x} = \frac{4965}{135} = 36.8$$

$$\boxed{\text{Mean} = 36.8}$$

Md - 68th term in class 6

$$\text{Md} = 35.5 + \frac{11}{30} \times 5$$

$$= 35.5 + 1.8$$

$$\boxed{\text{Median} = 37.3}$$

$$\text{M.D.} = \frac{1210.2}{135} = 9.0$$

$$\boxed{\text{Mean Deviation} = 9.0}$$

11.

Class Boundaries	Class Mark	Tally	Fre- quency	Cum. Freq.	Freq. x Class Mark $f\cdot x$	Dev. From Mean $\lvert x - \bar{x}\rvert$	Freq. x Dev. $f\lvert x - \bar{x}\rvert$
12.5-19.5	16		3	3	48.	33.3	99.9
19.5-26.5	23		6	9	138.	26.3	157.8
26.5-33.5	30		10	19	300.	19.3	193.0
33.5-40.5	37		15	34	555.	12.3	184.5
40.5-47.5	44		18	52	792.	5.3	95.4
47.5-54.5	51		26	78	1326.	1.7	44.2
54.5-61.5	58		16	94	928.	8.7	139.2
61.5-68.5	65		13	107	845.	15.7	204.1
68.5-75.5	72		7	114	504.	22.7	158.9
75.5-82.5	79		5	119	395.	29.7	148.5
82.5-89.5	86		1	120	86.	36.7	36.7
		TOTALS→	120		5917		1462.2

$\bar{x} = \frac{5917}{120} = 49.3$

$\boxed{\text{Mean} = 49.3}$

Md - is the 60.5th number and is in class 6

$\text{Md} = 47.5 + \frac{8.5}{26} \times 7$

$= 47.5 + 2.3$

$\boxed{\text{Median} = 49.8}$

$\text{M.D.} = \frac{1462.2}{120} = 12.2$

$\boxed{\text{Mean Deviation} = 12.2}$

OP.I. ANNUITIES

1 1. Compute the compound amount, after 5 years, if $4000 has been invested at 9% and compounded quarterly.

2. Bert Lougheed established an education fund for his daughter by investing $6000 at 10% in 1980. If the interest was compounded semi-annually:

a) What would the total amount be after 15 years?
b) How much of the amount would be due to accrued interest?
c) Express the increased buying power of the $6000, after 15 years, as a percent rate, if inflation over the 15-year period was 180%.

2 1. Eugene Picklyk wanted to invest enough money at 14%, compounded quarterly, so that in eight years his son would have $7500 to spend on an automobile. How much should he invest? (Calculate the present value.)

2. The compound amount of an invested principal had grown to $22 500.00 in 16 years. The money earned interest at the rate of 12% compounded annually. What was the original principal?

3,4 1. Match the following:

Types

1. Ordinary ____
2. Contingent ____
3. Deferred ____
4. Annuity Certain ____
5. Perpetuity ____
6. Annuity Due ____

Description

a. Begins on a definite date but the ending date depends on a future event.
b. These begin on a definite date but the length of the term is undefined.
c. Begin and end on pre-arranged dates.
d. The payments are made at the end of each interval but the first interval does not begin until some later time.
e. Payments are made at the end of each interval.
f. Payments are made at the beginning of each interval.

5 Indicate whether the following statements are true or false.

1. In a complex annuity, the payment interval and the interest conversion are identical.
2. An annuity is classified as an ordinary annuity because of the date [illegible] the payments.
3. An ordinary simple annuity is one in which the payments are made at the end of the interval.
4. There is no such thing as an ordinary complex annuity.
5. A deferred annuity is also automatically a perpetual annuity.
6. The termination date of a contingent annuity depends on some future event.
7. The word, 'annuity,' implies a series of periodic payments.

6 1. Mr. Waddell decided to invest all the Family Allowance cheques for his son until his fifteenth birthday. He was able to arrange a scheme whereby the investment would bear 12% for 15 years. What amount of money would be accumulated by this plan if the monthly allowance was $18?

2. Calculate the regular payment required to accumulate $3800.00 over a 5-year period if the money bears 15% compounded quarterly. This is a simple annuity; i.e., the payment interval and the interest conversion period are the same.

7 1. An ordinary simple annuity calls for $400 to be paid every 6 months bearing interest at 10% for 8 years, compounded semi-annually. Calculate the present value.

2. What is the present value of an ordinary simple annuity by which the monthly family allowance payments of $18 are invested for 15 years at 12% compounded monthly?

8 1. In a complex annuity, the payment interval and the conversion period are not the same. For example, if you put away $30 every month for 5 years and your money bears 12% interest compounded semi-annually, you have a complex annuity. Calculate the amount of this annuity.

2. If the amount, Sn, of a complex annuity is $6500, calculate the regular payment required if the payment is to be made monthly, bearing 15% compounded quarterly, for 7 years.

9

1. Compute the present value of the annuity described in 8-1.

2. Compute the present value of the annuity described in 8-2.

Formulae

Compound amount	$A = P(1 + r)^n$
Present value or principal of a compound amount	$P = \dfrac{A}{(1 + r)^n}$
Amount of an ordinary simple annuity	$S_n = R\,\dfrac{(1 + i)^n - 1}{i}$
Present value of an ordinary simple annuity	$A_n = R\,\dfrac{1 - (1 + i)^{-n}}{i}$
Amount of an ordinary complex annuity	$S_n = R\,\dfrac{(1 + i)^{nc} - 1}{(1 + i)^c - 1}$
Present value of an ordinary complex annuity	$A_n = R\,\dfrac{1 - (1 + i)^{-nc}}{(1 + i)^c - 1}$
Mortgage balance after n payments	$B_n = P(1 + r_m)^n - A\,\dfrac{(1 + r_m)^n - 1}{r_m}$

OP.1. ANNUITIES - ANSWERS

1

1. $A = P(1 + r)^n = \$6242.04$

2. a) $A = \$12\ 473.57$
   b) Accrued interest is $6473.57
   c) 15.5%

2

1. $P = \frac{A}{(1 + r)^n}$; $P = \$2494.42$

2. $P = \$18\ 590.64$

3,4

1. e
2. a
3. d
4. c
5. b
6. f

5

1. F
2. T
3. T
4. F
5. F
6. T
7. T

6

1. $S_n = \$8992.44$

2. $R = \$130.96$

7

1. $4335.11
2. $1499.79

8

1. $2431.19
2. $44.51

9

1. $1357.56
2. $2318.97

OP.11. DEPRECIATION AND DISTRIBUTION OF OVERHEAD COSTS (1 MODULE)

A DEPRECIATION

1. No exercises required for definition.

2.
1. Robertson's Mfg. Co. purchased an office desk for $240. Ten years later, it was sold for $35. What was the total depreciation on the desk?

2. A student purchased a typewriter for $160 when he started grade ten. After graduation from grade twelve, he traded it for an electric machine. Its trade-in value was $50. What was the total depreciation on the typewriter?

3. A young couple purchased a freezer for $329.99 and used it for 15 years. At the end of that time, the freezer was completely worn out and had to be scrapped. Find the total depreciation on the freezer.

3.
1. Delta Delivery Co. purchased a van for $13 500 in 1980. Three years later, it was sold for $5500. Using the straight-line method of depreciation, calculate a) total depreciation, b) annual depreciation, c) monthly depreciation.

2. Aldershaw Appliance Repairs purchased tools and equipment to a value of $27 000 when the company first started in business. Eight years later, they replaced it, and were given a trade-in allowance of $3000. Find a) total depreciation, b) annual depreciation, c) monthly depreciation.

3. The Aldershaw company purchased a copying machine for their establishment at a total cost of $2500. After 15 years, the copier was worn out and had to be replaced. Calculate a) total depreciation, b) annual depreciation, c) monthly depreciation.

4. Aldershaw's also bought six vans when they started in business, at a cost of $12 500 each. When they were traded in four years later, they were valued at $4200 each. For the entire fleet of vans, find a) total depreciation, b) annual depreciation, c) monthly depreciation.

4. No exercises.

5. 1. A truck is purchased for $38 800. If it depreciates by $7500 annually, find the book value at the end of each of the first three years.

2. An automobile is purchased for $12 400. Four years later, it is valued at $4600. a) Find the total depreciation. b) Find the annual depreciation. c) Find the book value of the automobile at the end of each of the four years.

3. Sandy's Soupery has kitchen appliances worth a total of $2510. If the appliances are worthless at the end of ten years, calculate a) the amount of annual depreciation, and b) the book value of the appliances at the end of the seventh year.

6. 1. Complete the following table:

No.	Item	Price	Disposal Value	Years In Use	Annual Deprec'n	Book Value 3rd Year	% Rate of Deprec'n
1	Calculator	265.95	50.00	8			
2	Typewriter	844.00	150.00	6			
3	Copier	8400.00	2500.00	15			
4	Desk	585.00	212.00	12			
5	Filing Cabinet	362.00	75.00	12			
6	Chair	128.50	15.00	10			

2. You purchase a stereo for $895.00. After 12 years, it has a trade-in value of $130. Find a) total depreciation, b) annual depreciation, c) annual % rate of depreciation.

3. A wristwatch is priced at $260. It is worn for 12 years and then is no longer useful. Find the annual % rate of depreciation.

4. Rob James buys a camper for $16 800. Five years later, he sells it to a neighbor for $6200. Calculate the annual % rate of depreciation.

5. A classroom set of textbooks costs $426. If the books are completely worn out after 9 years, find the annual % rate of depreciation.

6. Lab equipment is purchased for a new clinic, and used for six years before being traded in on newer models. If the initial cost was $263 527.83, and the trade-in allowance amounted to $97 622.67, find the annual rate of depreciation.

7. A householder pays $1100 to have the roof of his house shingled. Twenty years later, the shingles must be replaced. Calculate the annual % rate of depreciation.

7. 1. Complete the following table:

No.	Asset	Cost	Disposal Value	Time	Total Deprec'n	Annual Deprec'n	Annual % Deprec'n	
							Straight Line	Declining Balance
1	Rug	2400	550	20 years				
2	Sofa	1395	345	10 years				
3	China Cabinet	1200	300	15 years				
4	Bedroom Suite	2150	525	12 years				
5	Stove	775	125	8 years				

2. Complete the following table:

Year	Bond Value	% Rate of Deprec'n	Amount of Deprec'n
1	$12 000	22%	
2		22%	
3		22%	
4		22%	
5		22%	

3. Nora Lister buys a motorbike for $2000. Calculate the book value of her bike after 3 years, if the declining balance rate of depreciation is 20%.

4. A dining room suite is priced at $1500. If the rate of depreciation on the declining balance is 18%, find the book value at the end of the fourth year of ownership.

5. 'The Mice,' a rock group, purchased sound equipment at a cost of $3600. Calculate the book value of the equipment after 2 years, if the declining balance method is used, at an annual rate of 25%.

6. The Clayville Fire Department purchases a new pumper unit at a total cost of $96 200.00. They compute depreciation by the declining balance method, at an annual rate of 12%. Find the total depreciation and book value at the end of each of the first 3 years.

8. 1. Using the sum of the years digits method, calculate annual depreciation for each of the items listed, for years 1, 2 and 3 as indicated.

Item	Price	Scrap Value	Years Held	Year 1	Year 2	Year 3
1	2650	850	6			
2	3400	1600	4			
3	1680	460	8			
4	1200	325	7			
5	990	140	5			
6	800	175	3			

2. Boswell Ames purchased a snowblower for $560. At the end of 4 years, he traded it for a new machine and received a $200 trade-in allowance. Calculate the depreciation for each of the four years, by the sum of the digits method.

3. Harley Wintergreen bought a grand piano for $12 000, kept it for 18 years and then sold it for $7200. Calculate the depreciation for each of the first two years, using the sum of the digits method.

9. 1. The Dandy Distributorship purchased a new delivery van at a price of $12 000. The company expects to trade in the van after 5 years for a value of $7000. Calculate the depreciation and the book value for each of the 5 years a) by the straight line method, b) by the declining balance method, and c) by the sum of the digits method.

2. Teddy's Trustworthy construction purchased a used front-end loader for $100 000. At the end of 5 years the loader had a scrap value of $80 000. Calculate the amount of depreciation and the book value for each of the five years using:

a) the straight line method
b) the declining balance method
c) the sum of years digits method

B. DISTRIBUTION OF OVERHEAD COSTS

1. 1. The Rombough Manufacturing Co. pays an annual rent of $36 0000 for its business premises. Calculate the amount to be charged to each department if costs are allocated according to floor space occupied.

Department	Floor Space Occupied	Share of Rent
Sales	160 m^2	
Production	2000 m^2	
Packaging	840 m^2	
Clerical	120 m^2	
Administration	80 m^2	

2. A community recreation complex allocates utilities expense according to floor space occupied. Calculate the amount to be charged to each department if the total cost of utilities amounts to $1864.00 per month.

Department	Floor Space Occupied	Share of Utilities Expense
Skating Rink	1500 m^2	
Swimming Pool	600 m^2	
Bowling Alley	400 m^2	
Crafts Rooms	100 m^2	
General Purpose Hall	480 m^2	
Exercise Rooms	64 m^2	
Games Room	36 m^2	

3. The five factory departments of the McIntyre Manufacturing Company occupy floor space as follows:

Warehouse Room	1200 m^2
Assembly Room	2000 m^2
Painting and Finishing Room	1800 m^2
Carpentry Room	1500 m^2
Shipping Area	1000 m^2

The annual rental cost of the factory building is $64 000. The annual utilities expense is $24 000. Both of these costs are distributed on the basis of the floor space each department occupies. What amount should be charged annually to each department or each of these expenses?

4. The five departments of the Mangin Corporation occupy floor space as follows:

Executive	1000 m^2
Administrative	1500 m^2
Sales	2500 m^2
Market Research	1800 m^2
Personnel	1200 m^2

Below is a list of expenses for the company. Calculate each department's share of the various expenses during the past year according to floor space each department occupies.

	Rent $80 000	Taxes $20 000	Utilities $28 000	Supplies $18 000	TOTALS
Executive					
Administrative					
Sales					
Market Research					
Personnel					
TOTALS	$	$	$	$	$

2. 1. Anderson's Real Estate has a monthly overhead expense of $1240.00. Allocate the cost to each department according to the number of employees in each.

Department	No. of Employees	Overhead Expense
Administration	8	
Property Management	7	
Advertising	3	
Clerical	21	
Mortgage	15	
Sales	60	

2. Morrow's Department Store has annual overhead of $36 420. Calculate the amount to be allocated to each of the following departments, on the basis of the number of employees in each.

Department	No. of Employees	Overhead Expense
Shoes	6	
Clothing	8	
Furniture	2	
Hardware	3	
Appliances	1	
Linens/Bedding	4	
Entertainment	5	
Clerical	12	
Books & Stationery	7	
Administration	9	

3. The five departments of the Wilson Auto Center had the following number of employees:

Automobile Parts	10
Repairs	15
Administrative	5
Clerical	8
Bookkeeping	2

The table below lists the expenses for the company. Calculate each department's share of the expenses during the past year based on the number of employees each department has.

Department	Rent $60 000	Utilities $32 000	Supplies $10 000	Taxes $12 000	Cafeteria $15 000	Totals
Auto Parts						
Repairs						
Administrative						
Clerical						
Bookkeeping						
TOTALS	$	$	$	$	$	$

3\.

1. Gordon's Stereo Supply Company allocates expenses based on the sales volume of each department. Total overhead expenses in August amounted to $1620.00. Calculate the amount to be charged to each department.

Department	Sales Volume	Overhead Expense
A	$2200	
B	2545	
C	2545	
D	6390	
E	5535	

2. Carol's Cosmetics Supply Company has overhead expense amounting to $580 for the month of September. How much of this expense will be allocated to each department, on the basis of sales volume?

Department	Sales Volume	Overhead Expense
A	$1590	
B	342	
C	2505	
D	752	
E	826	

OP. 11. DEPRECIATION AND DISTRIBUTION OF OVERHEAD COSTS - ANSWERS

A. DEPRECIATION

2. 1. 240 - 35 = $205
2. 160 - 50 = $110
3. $329.99

3. 1. 13 500 - 4500 = $9000 total depreciation
9000 ÷ 3 = 3000 annual depreciation
3000 ÷ 12 = 250 monthly depreciation

2. a) $24 000
b) $3000
c) $250

3. a) $2500
b) $166.67
c) $13.89

4. a) $8300
b) $2075
c) $172.92

5. 1. $38 800 - 7500 = $31 300 after 1 year
$31 300 - 7500 = $23 800 after 2 years
$23 800 - 7500 = $16 300 after 3 years

2. a) $7800.00
b) $1950.00
c) $12 400 - 1950 = 10 450 book value after 1 year
$10 450 - 1950 = 8 500 book value after 2 years
$ 8 500 - 1950 = 6 550 book value after 3 years
$ 6 550 - 1950 = 4 600 book value after 4 years

3. a) $2510
b) $2510 ÷ 10 = 251 depreciation per year
251 x 7 = 1757 total depreciation after 7 years
2510 - 1757 = $753 book value after 7 years

6.

1	$ 26.99	$184.98	10.1%
2	115.67	496.99	13.[illegible]
3	393.33	7220.01	4.7
4	31.08	491.76	5.3
5	23.92	290.24	6.6
6	11.35	94.45	8.8

2. a) 895 - 130 = $765
b) 765 ÷ 12 = 63.75
c) 63.75/895 x 100 = 7.1%

3. 8.3%
4. 12.6%
5. 11.1%
6. 10.5%
7. 5%

7.

1.

1	1850	92.50	3.9%	7.8%
2	1050	105.00	7.5%	15%
3	900	60.00	5.0%	10%
4	1625	135.42	6.3%	12.6%
5	650	81.25	10.5%	21%

2.

1	$12 000.00	22%	$2640.00
2	9 360.00	22%	2059.20
3	7 300.80	22%	1606.18
4	5 694.62	22%	1252.82
5	4 441.80	22%	977.20

3. $1024
4. $678.18
5. $2025

6.

Year 1:	$11 544.00	$84 656.00
Year 2:	$10 158.72	$74 497.28
Year 3:	$ 8 939.67	$65 557.61

8.

1. 1 + 2 + 3 + 4 + 5 + 6 = 21; 2650 - 850 = 1800 total depreciation
6/21 x 1800 = $514.29 in year 1
5/21 x 1800 = $428.57 in year 2
4/21 x 1800 = $342.86 in year 3

1	$514.29	$428.57	$342.86
2	720.00	540.00	360.00
3	271.11	237.22	203.33
4	218.75	187.50	156.25
5	283.33	226.67	170.00
6	312.50	208.33	104.17

2.

Year 1	$144
2	108
3	72
4	36

3.

Year 1	$505.26
2	477.19

9.

1. a) $12 000 - 7000 = 5000 total depreciation in 5 years
$5000 ÷ 5 = $1000 per year
12 000 - 1000 = $11 000 book value at end of Year 1
11 000 - 1000 = $10 000 book value at end of Year 2
10 000 - 1000 = $ 9 000 book value at end of Year 3
9 000 - 1000 = $ 8 000 book value at end of Year 4
8 000 - 1000 = $ 7 000 book value at end of Year 5

b) Rate is 21.5%

		Deprec'n		Book Value
Year 1	21.5% × 12 000 =	2580.00	12 000.00 - 2580.00 =	9420.00
Year 2	21.5% × 9 420 =	2025.30	9 420.00 - 2025.30 =	7394.70
Year 3	21.5% × 7394.20=	1589.86	9 394.70 - 1589.86 =	5804.84
Year 4	21.5% × 5804.84=	1248.04	5 804.84 - 1248.04 =	4556.80
Year 5	21.5% × 4556.80=	979.71	4 556.80 - 979.71 =	3477.09

c) 1 + 2 + 3 + 4 + 5 = 15

		Deprec'n		Book Value
Year 1	5/15 × 5000 =	$1666.67	12 000.00 - 1666.67 =	10 333.33
Year 2	4/15 × 5000 =	1333.33	10 333.33 - 1333.33 =	9 000.00
Year 3	3/15 × 5000 =	1000.00	9 000.00 - 1000.00 =	8 000.00
Year 4	2/15 × 5000 =	666.67	8 000.00 - 666.67 =	7 333.33
Year 5	1/15 × 5000 =	333.33	7 333.33 - 333.33 =	7 000.00

2. a) Depreciation \$100 000 - \$80 000 = \$20 000
\$20 000 ÷ 5 = \$4000 per year
\$100 000 - 4000 = \$96 000 book value Year 1
\$ 96 000 - 4000 = \$92 000 book value Year 2
\$ 92 000 - 4000 = \$88 000 book value Year 3
\$ 88 000 - 4000 = \$84 000 book value Year 4
\$ 84 000 - 4000 = \$80 000 book value Year 5

b) Straight line percent rate is $\frac{4000}{100\ 000} = 4\%$

Declining balance percent rate is 4% × 2 = 8%

Year		Deprec'n		Book Value
1	100 000.00 × 8% =	8000.00	100 000.00 - 8000.00 =	92 000.00
2	92 000.00 × 8% =	7360.00	92 000.00 - 7360.00 =	84 640.00
3	84 640.00 × 8% =	6771.20	84 640.00 - 6771.30 =	77 868.80
4	77 818.80 × 8% =	6229.50	77 868.80 - 6229.50 =	71 639.30
5	71 639.30 × 8% =	5731.14	71 639.30 - 5731.14 =	65 908.16

c) 1 + 2 + 3 + 4 + 5 = 15

Year		Deprec'n		Book Value
1	5/15 × 20 000 =	6666.67	100 000.00 - 6666.67 =	93 333.33
2	4/15 × 20 000 =	5333.33	93 333.33 - 5333.33 =	88 000.00
3	3/15 × 20 000 =	4000.00	88 000.00 - 4000.00 =	84 000.00
4	2/15 × 20 000 =	2666.67	84 000.00 - 2666.67 =	81 333.33
5	1/15 × 20 000 =	1333.33	81 333.33 - 1333.33 =	80 000.00

B. DISTRIBUTION OF OVERHEAD COSTS

1\.

1. $1800; $22 500; $9450; $1350; $900
2. $879.25; $351.70 $234.47; $58.62; $281.36; $37.51; $21.10
3. Rent: $10 240; $17 066.67; $15 360; $12 800; $8533.33
   Utilities: $3840; $6400; $5760; $4800; $3200

SHARE OF EACH EXPENSE

Department	Rent $80 000	Taxes $20 000	Utilities $28 000	Supplies $18 000	Totals
Executive	$10 000	$ 2 500	$ 3 500	$ 2 250	$18 250
Administrative	15 000	3 750	5 250	3 375	27 375
Sales	25 000	6 250	8 750	5 625	45 625
Market Research	18 000	4 500	6 300	4 050	32 850
Personnel	13 000	3 000	4 200	2 700	21 900
TOTALS	$ 80 000	$20 000	$28 000	$18 000	$146 000

2\.

1. $87.02; $76.14; $32.63; $228.42; $163.16; $652.63
2. $3833.68; $5111.58; $1277.89; $1916.84; $638.95; 2555.79; $3194.74
   $7667.37; $4472.63; $5750.53.

SHARE OF EACH EXPENSE

Department	Rent $60 000	Utilities $32 000	Supplies $10 000	Taxes $12 000	Cafeteria $15 000	Totals
Auto Parts	$15 000	$ 8 000	$ 2 500	$ 3 000	$ 3 750	$32 250
Repairs	22 500	12 000	3 750	4 500	5 625	48 375
Administrative	7 500	4 000	1 250	1 500	1 875	16 125
Clerical	12 000	6 400	2 000	2 400	3 000	25 800
Bookkeeping	3 000	1 660	500	600	750	6 450
TOTALS	$60 000	$32 000	$10 000	$12 000	$15 000	$129 000

3\.

1. $171.18; $322.91; $198.03; $497.20; $430.68;
2. $153.32; $32.98; $241.55; $72.51; $79.65.

OP.III. DIGITAL LOGIC

REVIEW OF THE BINARY NUMBER SYSTEM

1. Write the decimal number 3569 as the sum of products. Multiply each digit by the power of 10 it represents and add the results.

2. List the first 10 powers of 2. For example $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, etc.

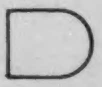
3. Let 101 101 be a number in the binary system. Each digit multiplies a different power of 2. Evaluate the number as a sum of products and write the decimal equivalent number.

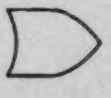
4. Express 75_{10} in binary code. The subscript 10 is to remind you that 75 is written in the decimal code (base 10).

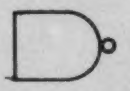
5. Make a list of the numbers 0 to 15_{10} and give the binary code for each one.

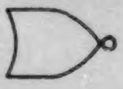
6. Assume there are three connections on an electrical device. You are required to apply a 0 or a 1 to each connection. How many different ways can you apply a 0 and 1 to three connections? Make a list of all the possibilities.

III-1. 1. Write the name of the gate that each symbol represents:

a) 

b) 

c) 

d) 

III-2. 1. How many different connection combinations of 1 and 0 can be applied to a 4-input gate?

III-3. 1. The function of an AND gate is the same as 2 or more switches connected in ________________.

2. The function of an OR gate is the same as 2 or more switches connected in ________________.

3. The function of a NOR gate is the same as 2 or more switches connected in ________________ followed by an ____________________.

III-4.

1. Give the names and symbols of two gates which are controlled by a 1 (high) input.
2. Give the names and symbols of two gates which are controlled by a 0 (low) input.

III-5.

1. Draw a two-input AND gate and prepare a truth table listing all the possible input combinations and the outputs.
2. Draw a two-input NOR gate and prepare a truth table listing all the possible input combinations and the outputs.

III-6.

1. Draw the symbol for a three-input OR gate with one of the inputs inverted.
2. Draw the symbol for a four-input NAND gate with any two of the inputs inverted.

III-7.

1. Give the decimal equivalent of the following binary numbers:

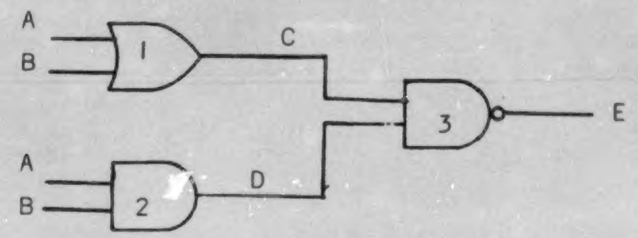
   a) 101
   b) 1101
   c) 11
   d) 00101
   e) 10100
   f) 100
   g) 1111

III-8.

1. Prepare a truth table for a 4-input AND gate. Complete the output column.

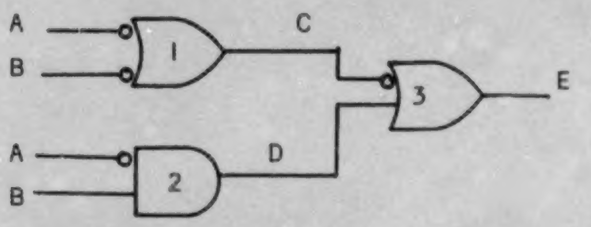
III-9.

1. Prepare a truth table showing all the inputs and outputs in the following combination of gates:

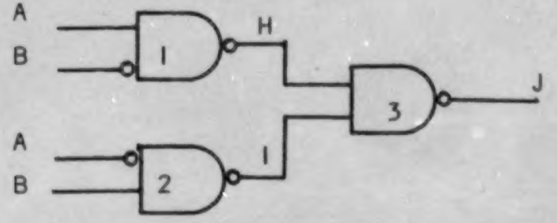


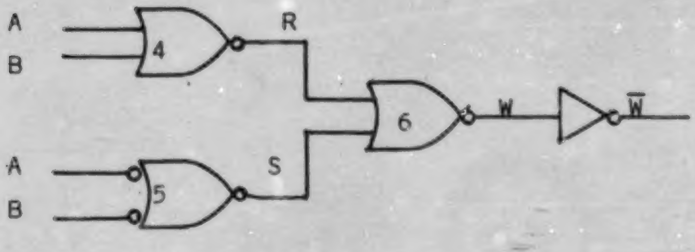
III-10. 1. What is meant by inverting the logic level of a signal?

III-11. 1. Prepare a truth table showing the inputs and outputs in the following combination of gates:



III-12. 1. Prepare a truth table to compare the outputs of these two circuits; i.e., compare J and W and $\overline{W}$. ($\overline{W}$ is read as not W.)





III-13. 1. Explain the main difference between combinational and sequential logic.

III-14. 1. Draw the symbol for a latch or flip-flop and state its most significant function.

III-15. 1. Draw the schematic of the internal circuit of a memory cell.

2. Assume the initial condition of a latch is SET. List and explain the output of the latch as high and low (I and 0) signals are applied to the SET and CLEAR inputs. The inputs are controlled by spring-loaded switches.

III-16. 1. Show the output wave of a simple set/re-set latch, given the input signal waves.

III-17. 1. Explain the following:
a) MSB
b) LSB
c) cascaded latches

III-18. 1. Assume 10 pulses are applied to the switch of the binary counter. Show the output on the LEDs after every pulse.

OP.III. DIGITAL LOGIC - ANSWERS

REVIEW OF BINARY CODE

1. $3 \times 10^3 + 5 \times 10^2 + 6 \times 10^1 + 9 \times 10^0$
   The digits from left to right have weighted values since they represent descending powers of 10.

2. $2^0 = 1$
   $2^1 = 2$
   $2^2 = 4$
   $2^3 = 8$
   $2^4 = 16$
   $2^5 = 32$
   $2^6 = 64$
   $2^7 = 128$
   $2^8 = 256$
   $2^9 = 512$

   Note: $2^0 = 1$ because of the law of exponents which states that $a^x \div a^y = a^{x-y}$. Consider a numerical example:

   $$5^3 \div 5^3 = \frac{5^3}{5^3} = 1 \text{ and } 5^3 \div 5^3 = 5^{3-3} = 5^0$$

   Therefore $5^0 = 1$ and for any base, x: $x^0 = 1$

   This extraordinary property of the zero exponent guarantees there will be a unit (one) in any number system.

3. $1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 32 + 0 +$
   $8 + 4 + 0 + 1 = 45_{10}$

4. 75 - 2 = 37 remainder 1 LSB
   37 - 2 = 18 remainder 1
   18 - 2 = 9 remainder 0
   9 - 2 = 4 remainder 1
   4 - 2 = 2 remainder 0
   2 - 2 = 1 remainder 0
   *1 - 2 = 0 remainder 1 MSB

   Therefore $75_{10} = 1001011_2$

   Check this result the way question #3 is done.

   *Read each step in the above series of divisions with remainders very carefully, especially the last step.

5.

0	0000	8	1000
1	0001	9	1001
2	0010	10	1010
3	0011	11	1011
4	0100	12	1100
5	0101	13	1101
6	0110	14	1110
7	0111	15	1111

6. There will be 8 combinations since $2^3 = 8$. The most orderly and direct way is to write the binary number codes for the decimal numbers 0 to 7.

000	100
001	101
010	110
011	111

III-1. 1. a) AND b) OR c) NAND d) NOR

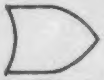
III-2. 1. $2^4 = 16$. Make a list of the binary code for decimal numbers from 0 to 15.

III-3. 1. series. If any switch in a series is open, the circuit is open. That is why we say an AND gate is controlled by a low signal (zero). Also, AND gates are inhibited by low inputs.

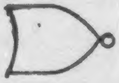
2. parallel. If three switches are connected in parallel, any one of them can activate the circuit. That is why we say an OR gate is controlled by a high signal (one). Also, OR gates are enabled by high inputs.

3. parallel, inverter.

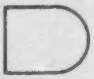
III-4. 1. OR gate



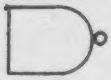
NOR gate



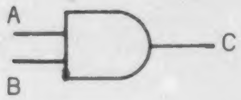
2. AND gate



NAND gate



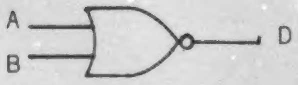
III-5. 1.



A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

Notice that the input columns A and B simply reflect the binary coding of the decimal numbers 0 to 3; i.e., the first four binary numbers. Column C shows the output. Since a low signal controls the AND gate, it yields a low output whenever any one or both inputs are low.

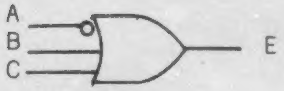
2.



A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

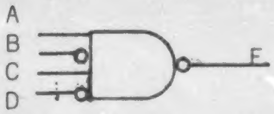
Any high input to an OR gate will produce a high output. The NOR gate produces the complement because of the inverter at the output. Note: the complement of 0 is 1 and the complement of 1 is 0.

III-6. 1.



The symbol is correct if any one of the inputs is inverted.

2.

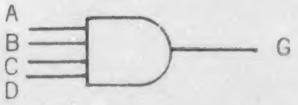


The symbol is correct if any two of the inputs are inverted.

III-7. 1.

a) 5
b) 13
c) 3
d) 5; the leading zeros are not significant
e) 20
f) 4
g) 15

III-8.



A	B	C	D	G
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

Since a low signal controls the AND gate, the output is low if any one or all the inputs are low. The output is high only when all the inputs are high.

III-9. 1.

A	B	C	D	E
0	0	0	0	1
0	1	1	0	1
1	0	1	0	1
1	1	1	1	0

III-10. 1. Inverting the logic level means producing the complement. Zero (low) becomes high. One (high) becomes low.

III-11. 1.

A	B	C	D	E
0	0	1	0	0
0	1	1	1	1
1	0	1	0	0
1	1	0	0	1

Since gate 1 is an OR gate. any high input produces a high output. Since both inputs are inverted, any low signal produces a high output (see column C). Gate 2 is an AND gate and any low input produces a low output (column D). Gate 3 is an OR gate with one input inverted.
High D produces high E.
Low C produces high E.
Others produce low E.

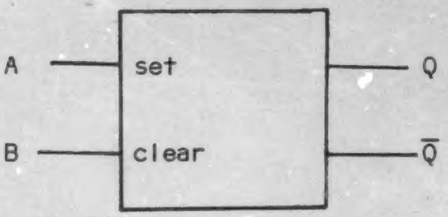
III-12. 1.

A	B	H	I	J	R	S	W	$\overline{W}$
0	0	1	1	0	1	0	0	1
0	1	1	0	1	0	0	1	0
1	0	0	1	1	0	0	1	0
1	1	1	1	0	0	1	0	1
				*			*	*

Conclusion: Columns J and W are the same. The inverter after W produces the complement of W. ($\overline{W}$ is read not W.)

III-13. 1. In a combinational circuit, the output is affected by every change in the input. In sequential logic, a change in the input may not change the output. The sequence of changes in input and the nature of the devices are important in determining the output. Sequential circuits will always involve at least one latch or memory cell.

III-14. 1.



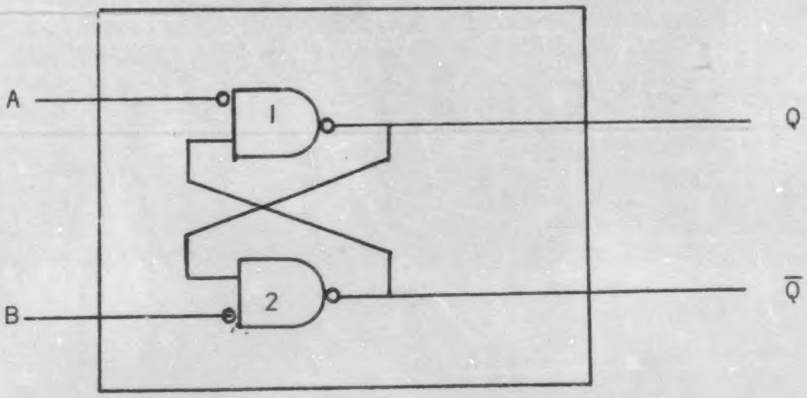
The set and clear conditions occur when A and B (respectively) have high signals.

Set condition $Q = 1$; $\overline{Q} = 0$

Clear condition $Q = 0$; $\overline{Q} = 1$

The output Q and $\overline{Q}$ always reflect the result of the last high pulse on A and B. Therefore, the latch output always retains the result of the last high input signal — hence, a memory cell.

III-15. 1.



2. Pencil in a zero on $\overline{Q}$, A, B and one on Q. Study the effects of applying ones to A and B alternately.

	A	B	Q	$\overline{Q}$	Comments
a)	0	0	1	0	Set - stable
b)	1	0	1	0	remains set
c)	0	0	1	0	remains set
d)	0	1	0	1	clear - stable
e)	0	0	0	1	remains clear
f)	1	1	X	$\overline{X}$	ambiguous

a) In the initial condition, $\overline{Q}$ supplies a low signal to gate 1 so this gate is inhibited and any change on A input will have no effect on the latch output.

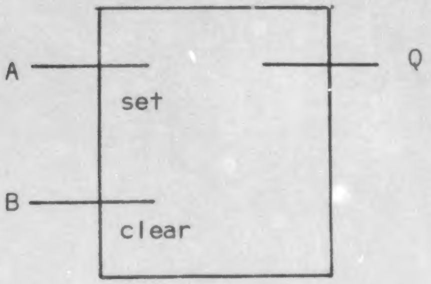
b),c) Refer to comment 'a' and trace the effect of the signals on A through the circuit.

d) The high signal on B does produce a change: the latch clears.

e) Changing B from high to low will not change the output. (The latch remembers: return the effect of the last high signal.)

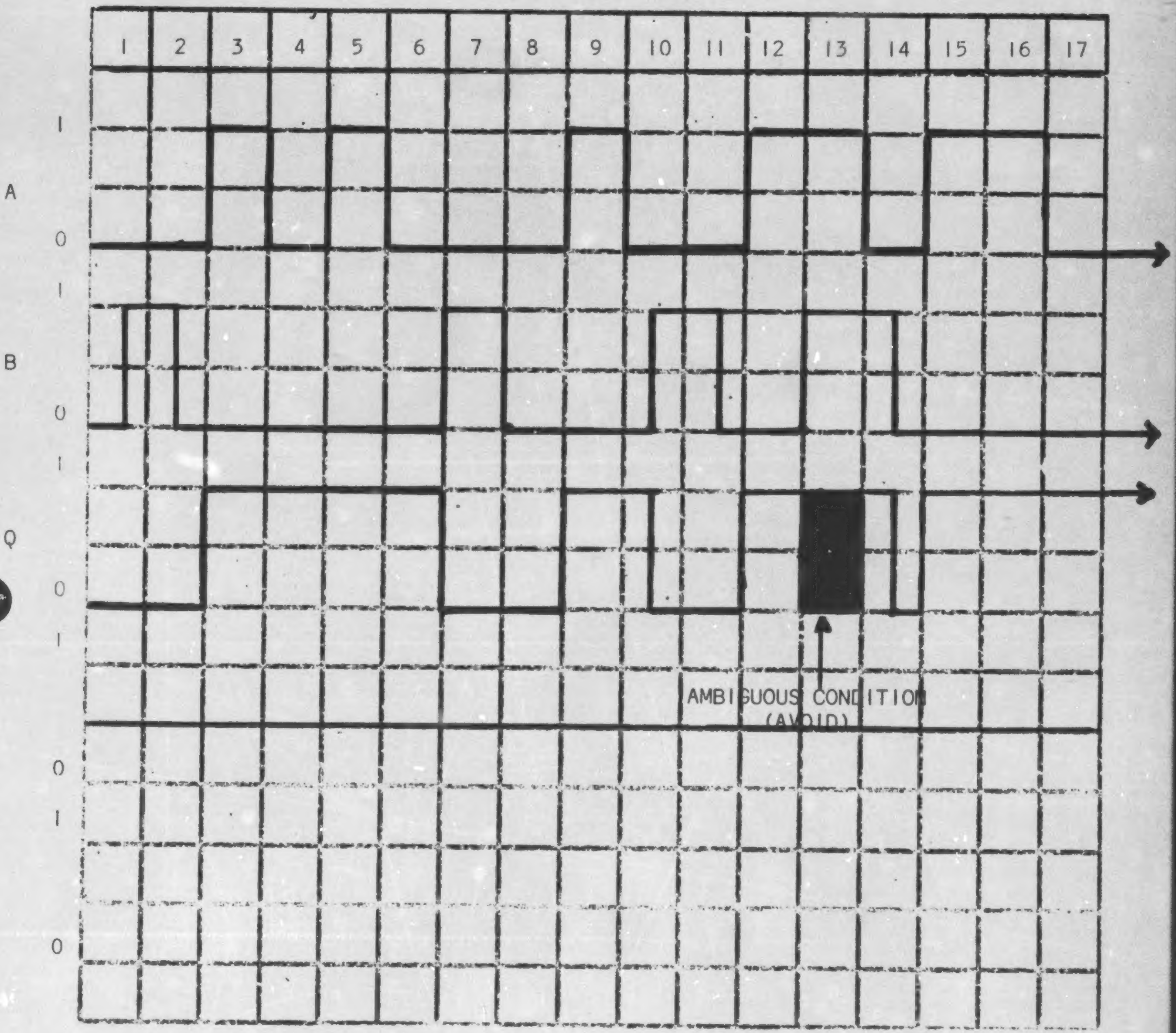
f) When both inputs are high, the output is not predictable and of no value.

III-16. 1.



Assume initial condition is clear and A and B are low.

Note: The changes from high to low on signals A and B do not change the output Q.


A
B
Q
AMBIGUOUS CONDITION
(AVOID)

III-17. 1. a) most significant bit
b) least significant bit
c) latches connected in series so that the output of A becomes the input for B and so on

III-18. 1. The LEDs will simply reflect the binary codes for the first 10 decimal numbers, beginning at zero.

0000 - 0
0001 - 1
0010 - 2
0011 - 3
0100 - 4
0101 - 5
0110 - 6
0111 - 7
1000 - 8
1001 - 9

LED stands for "light emitting diode."

OP. IV. INVESTMENTS (STOCKS, BONDS, REAL ESTATE)

A. STOCKS

In this section it is suggested that the teacher provide the students with a copy of an up-to-date report of a stock exchange. The teacher can then choose appropriate stocks to fill in the blanks in the questions that follow. After the teacher does this, the student can then answer the questions.

1.

1. What were the sales of Stock A for the day?
2. What was the highest price that Stock B sold for during the day?
3. What was the lowest price that Stock C sold for during the day?
4. What was the closing price of Stock D for the day?
5. Stock E closed at ____________ for the day. What was the closing price for the previous day?
6. Stock F closed at ____________ for the day. What was the closing price for the previous day?
7. What was the closing price of Stock G for the day?
8. What was the lowest price that Stock H sold for during the day?
9. What was the highest price that Stock I sold for during the day?
10. What were the sales of Stock J for the day?

2. Calculate the cost of purchasing the stocks listed below:

	Name of Stock	No. of Shares	Purchased At
1.		200	High
2.		1000	Low
3.		500	Close
4.		300	Low
5.		50	Close
6.		400	High
7.		300	Low
8.		150	Close
9.		1300	High
10.		1500	Close

11. R. Williams purchased 400 shares of ______________________ stock at the high of the day and 500 shares of ________________________ at the close of the day. What was the total cost of Williams' purchase?

12. J. Zeghers purchases 1000 shares of _______________________ at the high price of the day. How much would have been saved if the purchase had been made at the low price of the day instead?

3. Below is a schedule of commission rates that has been used by stockbrokers. Use this schedule to answer the questions that follow.

Base Rates Of Commission
for Orders up to and Including $20 000

a) For SHARES selling under $14.00 the COMMISSION is 2.5% of the value of the ORDER.

b) For SHARES selling at $14.00, and up to and including $30.00, the COMMISSION is 22.575 CENTS PER SHARE PLUS 0.8875% of the value of the ORDER.

c) For SHARES selling over $30.00 the COMMISSION is 1.64% of the value of the ORDER.

Minimum Commission

Orders under $10.00	Discretion of the broker
Orders of $10-$50.00	$2.00
Orders over $50.00	$5.00

	Stock Name	No. of Shares	Selling Price	Commission
1.	Abitibi 10	200	$35	
2.	Argus	500	$8 1/4	
3.	Brascan A	400	$16 1/2	
4.	Brunswk	300	$7 7/8	
5.	Camel Og	1000	$310	
6.	Ceres Res	500	$160	
7.	C Rambler	700	$470	
8.	C Falcon C	3000	$19 1/2	
9.	Echo 1987 W	400	$135	
10.	Gaz Metr	4000	$35 3/8	

11. John Jakes purchased 2000 shares of Finning BF Stock at a price of $400. Find the commission that was paid on the transaction.

4. Using the Schedule of Commission Rates, calculate the total cost of purchasing the following stocks.

	Stock	No. of Shares	Selling Price	Commission	Total Cost
1.	GMC	900	$57 1/2		
2.	Genstar L	2000	$12 3/4		
3.	F Cty Tn C	400	$15 3/8		
4.	Corby VT	300	$22 3/4		
5.	Cominco	4000	$35 1/4		
6.	Con Distrb	200	$ 6 3/4		
7.	Coho AF	1600	$ 3 3/5		

8. F. Simmons purchased 250 shares of CIL at a price of $20 3/4. What was the total cost of the purchase?

9. J. Jones purchased 1400 shares of Cableshar at $5 7/8 and 1200 shares of CAD FW at $ 6 7/8. What was the total cost of the purchase?

10. F. Fitzimmons purchased 1000 shares of BCP at $30 5/8. What was the total cost of the purchase?

5. Calculate the net proceeds from selling the stocks listed below.

	Stock	No. of Shares Sold	Selling Price	Gross Proceeds	Commission	Net Proceeds
1.	Algoma St.	400	$26 1/2			
2.	Anthes	1000	$92			
3.	BCPH	500	$31 1/2			
4.	Fed Ind A	1400	$11 1/2			
5.	Ford CNDA	1300	$32			
6.	Con Glass	150	$14 1/8			

7. D. Edwards decided to sell 3000 shares of F Calgary stock that had been bought two months previously. The selling price was $120. What were the net proceeds of the transaction?

8. E. Tolbert had purchased 200 shares of Chrysler stock at $8 1/2. Two months later Tolbert sold the stock when it was selling for $8 3/4. What were the net proceeds of the sale?

9. J. Walters decided to sell 300 GAZ 5.40 P stocks when the stock was selling at $66. What were the net proceeds of the sale?

10. The executor of the late J. Baines estate decides to sell shares purchased by the deceased. The executor sells 200 shares of FCA Intl stock at $8 and 250 shares of Exindcar stock at $8 1/2. What would be the net proceeds of the sale of stock to the estate?

6. 1. M. Draper purchased 100 shares of Ang CT 4 1/2 stock at a price of $15. Two months later the stock was sold at $13 1/2. Calculate the capital gain or loss from the sale of stock.

2. W. Watt purchased 200 shares of Agra Ind A stock at a price of $8 3/8. Watt decided to purchase real estate with her investment money and sold the stock for $12 1/4. Calculate the capital gain or loss incurred while the stock was held by Watt.

3. A. Kaminski decided to sell 1000 shares of CDC 1980 stock that had been left to her by her grandfather's estate. She sold the stock at a price of $13 1/4. Her grandfather had originally purchased the stock at a price of $11 1/8. Calculate the capital gain or loss between the time her grandfather bought the stock and the time Kaminski sold it.

4. R. Monnin sold 400 shares of CDC PR B stock at a price of $84. The stock had been purchased earlier in the day at a price of $81. Calculate the capital gain or loss made by Monnin's transactions during that day.

5. Is it possible to incur a capital loss on the sale of stock even if the selling price is higher than the purchase price? Why?

6. H. Hold purchased 100 shares of Alt Energy at a price of $12 1/8. Later the shares were sold at a price of $12 1/4. Calculate the capital gain or loss on the transaction.

7. Find the total dividend that the owners of the following common stock would receive:

	No. of Shares	Dividend and Period	Total Dividends for the year
1.	100	30¢ quarterly	
2.	250	50¢ semi-annually	
3.	1000	$1.20 annually	
4.	300	22¢ quarterly	
5.	400	38¢ quarterly	
6.	500	$1.10 semi-annually	
7.	200	$3.05 annually	
8.	100	$1.50 annually	
9.	150	40¢ quarterly	
10.	250	25¢ quarterly	

If you own preferred shares the dividend may be expressed as a percent rate of the par value.

Example: a $100 par value preferred stock paying a 5% dividend would pay: $100 x 5% = $5.00

Note that preferred dividends are always based on the par value and never the market value.

Find the total dividend that the owners of the following preferred stock would receive:

	No. of Shares	Par Value	Percent Rate of Dividend	Total Dividend
11.	75	$100	8%	
12.	150	$ 50	5 1/2 %	
13.	1000	$ 25	11%	
14.	800	$ 30	9%	
15.	2000	$ 20	6 3/4 %	
16.	300	$100	5 3/4 %	

8. Find the rate of return of the following stocks:

	Total Cost Per Share	Yearly Dividend	Percent Rate of Return
1.	$36 1/8	$2.75	
2.	$14 1/4	$1.60	
3.	$8 1/2	$0.65	
4.	360	$0.18	

5. Dwayne Ennis purchased 100 shares of GMC at $57 1/2 plus commission. The stock pays semi-annual dividends of $2.25 per share. What is the percent rate of return on his investment?

6. Donna Vennard purchased 200 shares of CAMEL OG stock at 310 plus commission. The stock pays quarterly dividends of 12 cents per share. What is the percent rate of return on her investment?

7. C. Bowman purchased 300 shares of BCP preferred stock at a price of $20 5/8 plus commission. The stock pays a yearly dividend of 11% based on a par value of $25.00. What is the percent rate of return on this investment?

8. D. Metcalf purchased 300 shares of CON DISTRB common stock at a price of $6 3/4 plus commission. The stock pays a quarterly dividend of 18 cents per share. What is the percent rate of return on this investment?

9. C. Cuddy purchased 200 shares of EXTENDCAR stock at $8 1/2 plus commission and 150 shares of ELCTHAM stock at $5 5/8 plus commission. The EXTENDCAR stock pays a quarterly dividend of 25 cents a share and the ELCTHAM stock pays a semi-annual dividend of 30 cents a share. What is the percent rate of return on the total investment?

B BONDS

1. 1. Compute the market price in dollars and cents of a $1000 bond if the bond was selling at the following quoted prices:

a) 98
b) 96 3/4
c) 102 1/8
d) 103 1/8
e) 86 3/8
f) 99 3/4
g) 108
h) 97 1/4

2. What would you pay for twenty bonds if you purchased the bonds at 93 1/4? The bonds have a par value of $1000.

Find the amount invested in the following bond acquisitions:

	No. of Bonds	Par Value	Quoted Price	Total Invested
3.	4	$1000	96 1/8	
4.	10	$ 500	94 1/4	
5.	8	$1000	102 1/8	
6.	5	$1000	107 3/8	
7.	6	$ 500	97 1/2	

2. Questions in this section will assume a commission rate of 1/2% on the value of the purchase.

Example: What would you pay for a $1000 bond selling at 98 1/2 plus commission?

Solution:		
	Cost of 1 bond	$1000 × 98 1/2 = $985
	Commission	$985 × .5% = $4.93
	Total Cost	$985 + $4.93 = $989.93

Calculate the total amount invested if you purchased the following bonds:

	No. of Bonds	Par Value	Quoted Price	Cost	Commission	Total Investment
1.	10	$1000	94 1/2			
2.	6	$1000	86 1/8			
3.	3	$ 500	101 3/4			
4.	7	$1000	92 1/4			
5.	12	$1000	104 1/2			

6. Tom Landry purchased five $1000 bonds at 97 1/2 plus commission. What would be the amount of his investment?

7. Phyllis George purchased six $1000 bonds at 101 1/8 plus commission and five $500 bonds at 93 3/4 plus commission. Find the total amount of her investment.

3. Calculate the total bond income for each of the following:

	No. of Bonds	Par Value	Interest Rate	Total Bond Income
1.	6	$1000	8 1/2 %	
2.	7	$1000	10 1/4 %	
3.	10	$1000	12 1/2 %	
4.	3	$ 500	13 1/8 %	

5. What will be the annual income from twelve bonds having a par value of $1000 and paying 9 1/2 % interest?

6. Joe Adams purchased five $1000 bonds at 96 1/2 which pay interest at the rate of 8 1/2 %. What will be the annual income?

7. How much would each interest payment be on a $1000 bond paying 9% interest if the interest is paid semi-annually on August 1 and February 1?

For each of the following, find the total investment and the total annual income.

Note: Don't forget to include commission of 1/2 % in your calculations.

	No. of Bonds	Par Value	Quoted Price	Total Investment	Interest Rate	Annual Income
8.	4	$1000	88 1/2		9%	
9.	6	$1000	94 1/8		10%	
10.	10	$ 500	104 1/2		14%	
11.	12	$1000	84 1/4		7 1/2 %	
12.	8	$1000	93 1/8		9 1/2 %	

4. For each bond listed below, calculate the percent rate of return on investment.

	Par Value	Interest Rate	Quoted Price	Commission
1.	$1000	9%	96 1/8	.5%
2.	$1000	8 1/2 %	92 1/4	.5%
3.	$ 500	11%	99 1/2	.5%
4.	$ 500	12 1/4%	102 1/4	.5%
5.	$1000	7 1/8 %	88 1/2	.5%
6.	$1000	10 1/4 %	98 1/4	.5%

7. A $1000 bond, bearing interest at 13%, was purchased at 104 1/2 plus commission. What is the percent rate of return on this investment?

8. K. Smith was trying to decide between two types of bonds. One bond was a $1000, 8% bond selling at 92 1/2 plus commission. The other bond was a $1000, 10% bond selling at 98 1/4 plus commission. Which bond has the higher percent rate of return on investment?

9. What is the percent rate of return on a $1000 bond purchased at 67 1/4 plus commission if the bond paid interest of 4 1/2 %?

10. What is the percent rate of return on a $1000 bond purchased at 105 1/2 plus commission if the bond paid interest of 13 1/4%?

C REAL ESTATE

1\.

1. Wilson bought a house for $46 000, paying $14 000 down and assuming an existing 10% mortgage for the remainder. During the first year, $425 a month was received for rent. Expenses for the year included:
   . interest at 10% on the amount of the mortgage
   . 2% depreciation on the house
   . taxes, repairs, insurance and other expenses totaling $925
   What was the net income from owning the house?

2. Smith decided to invest in real estate. She purchased both halves of a duplex for $84 000. During the year each side was rented out for $440 a month. Smith had a down payment of $31 000 and took out a mortgage at 15% for the balance. During the year, the following expenses were incurred:
   . interest at 15% on the mortgage
   . 1.5% depreciation on the house
   . taxes, insurance and other items $2100
   Calculate Smith's net income from owning this duplex.

3. J. Snead bought a house for $52 000, paying $16 000 down and taking out a 14% mortgage on the remaining balance. Snead was able to rent the house for $475 a month. Expenses for the year included:
   - interest at 14% on the mortgage
   - 3% depreciation on the house
   - taxes of $760.00
   - insurance of $151.00

   What was the net income from owning the house?

2\.

1. Calculate the rate of return on investment in problems 1, 2 and 3 of the previous section.

2. Given the above rates of return, why would a person invest money in real estate?

Review Questions - A

Give the student a copy of a Stock Exchange. The teacher can then choose appropriate stocks to fill in the blanks in the questions that follow:

1. What were the sales of ____________________ during the day?

2. Shares of ____________________ closed at ____________________ today. This was an increase of ____________________ from yesterday's closing. What was yesterday's closing?

3. What was the lowest price that ____________________ sold for during the day?

4. What was the highest price that ____________________ sold for during the day?

5. What was the closing price of ____________________ for the day?

6. Calculate the total cost of purchasing 1000 shares of Corn Lake stock at a price of $15 plus commission.

7. Calculate the total cost of purchasing 500 shares Genstar $2.35 stock at a price of $17 5/8 plus commission.

8. Calculate the total cost of purchasing 400 shares of CDC pr B stock at a price of $85 1/2 plus commission.

9. Find the net proceeds from the sale of 100 shares of Alum 3rd p stock at a price of $20 less commission.

10. A person bought 1000 shares of Budd Can stock at a price of $4.30. Two months later the stock sold for $5.60. Calculate the capital gain or loss from the sale of stock.

11. What yearly income will a person receive from common stock that pays a dividend of 60 cents per share quarterly, if they own 200 shares?

12. John Smalley purchased 100 preferred shares. The shares had a par value of $50.00 and had a dividend of 10%. Calculate the total dividend received by Smalley.

13. Butch Norman purchased 200 shares of CON Gas B stock at a price of $38.00 plus commission. The stock pays a semi-annual dividend of $1.60. What is the percent rate of return on this investment?

Review Questions-B

1. What would you pay for a $1000 bond selling at 86 1/2 plus commission of 1/2 % on the value of the purchase?

2. Roger Staubach purchased six $1000 bonds at 97 1/4 plus commission. What would be the amount of his investment?

3. Norm Turner purchased seven $1000 bonds at 93 1/2 plus commission and five $1000 bonds at 105 1/4 plus commission. What would be the amount of his investment?

4. John Sims purchased five $1000 bonds at 97 1/4 which pay interest at the rate of 9 1/2 %. What will be the annual income?

5. A $1000 bond, bearing interest at 14%, was purchased at 103 1/2 plus commission. What is the percent rate of return on this investment?

6. A $1000 bond, bearing interest at 8 1/4 %, was purchased at 94 1/8 plus commission. What is the percent rate of return on this investment?

Review Questions-C

1. Nettles decided to purchase a boarding house. The boarding house cost $80 000. Nettles made a down payment of $20 000 and took out a $60 000 mortgage at 12% on the balance. The boarding house had ten little suites, each of which was rented out for $130 a month. Expenses for the year were:
   . interest at 12% on the mortgage
   . depreciation at 1% of the cost of the property
   . taxes, insurance, and other expenses $2560

   Find the percent rate of return on this investment.

General Review Questions

1. M. Barber purchased 1000 shares of BCRIC stock at a price of $265. Calculate the commission that was paid on the transaction.

2. D. Casper purchased 500 shares of BCP 10.16 preferred stock at a price of $20 5/8 plus commission. What was the total cost of the purchase?

3. K. Stabler decided to sell 1000 shares of CON Gas B stock at a price of $38. What were the net proceeds of the sale?

4. G. Neilsen purchased 300 shares of Chieftain D stock at a price of $18 5/8. Three months later, he decided to sell the stock when its price had fallen to $13 5/8. Calculate the capital gain or loss from owning this stock.

5. What would be the annual dividend from owning 200 shares of common stock that pay a 30-cent quarterly dividend per share?

6. What would be your total dividend if you owned 100 preferred shares with a par value of $15, if the shares paid a dividend of 8%?

7. L. Crocker purchased 200 shares of CCL Ind stock at $5 1/4 plus commission. The stock pays semi-annual dividends of 30 cents per share. What is the percent rate of return on investment?

8. J. Thompson purchased six $1000 bonds at 98 1/2 plus commission. What would be the amount of the investment?

9. D. Parker purchased twelve $1000 bonds at 89 1/2 which pay interest at the rate of 8 1/2 %. What will be the annual income?

10. A $1000 bond, bearing interest at 12%, was purchased at 95 1/4 plus commission. What is the percent rate of return on this investment?

11. For $33 000, Easler can buy a house which rents for $405 a month. Taxes, insurance, and miscellaneous expenses average $1050 annually. Depreciation and repairs are estimated at $1510 a year. If Easler pays $33 000 cash for the property, calculate the percent rate of net income earned from this investment.

OP.IV. INVESTMENTS (STOCKS, BONDS, REAL ESTATE) - ANSWERS

A STOCKS

1,2. Answers will vary depending upon the type of stock that is chosen by the teacher.

3.

1. Cost of the stock: 200 x $35 = $7000.00. Because the share is selling for over $30, the commission is 1.64% of the value of the order.
   Therefore, Commission: $7000 x 1.64% = $114.80

2. Cost of the stock: 500 x $8.25 = $4125.00. Because the share is selling for under $14 the commission is 2.5% of the value of the order.
   Therefore, Commission: $4125 x 2.5% = $103.13

3. Cost of the stock: 400 x $16.50 = $6600.00. Because the share is selling over $14 and under $30 the commission is 22.575 cents per share plus 0.8875% of the value of the order.
   Therefore, Commission is made up of 2 parts: commission on shares: 400 x .22575 = $90.30; commission on value of order: $6600 x 0.8875% = $58.58. Total Commission: $90.30 + 58.58 = $148.88

4. $59.06
5. $77.50
6. $20.00
7. $82.25
8. $1196.44
9. $13.50
10. $2320.60
11. $200

4.

1. Cost of the stock: $57.50 x 900 = $51 750, Because the share is selling for more than $30, the commission is 1.64% of the value of the order.
   Therefore, Commission: $51 750 x 1.64% = $848.70
   Total Cost of Purchase: $51 750 + $848.70 = $52 598.70

2. Cost of the stock: $12.75 x 2000 = $25 500.00. Because the share is selling for under $14, the commission is 2.5% of the value of the order.
   Therefore, Commission: $25 500 x 2.5% = $637.50
   Total Cost of Purchase: $25 500 + 637.50 = $26 137.50

3. Cost of the stock: $15.375 x 400 = $6150. Because the share is selling over $14 and under $30, the commission is 22.575 cents per share plus 0.8875% of the value of the order.
   Commission: 400 x .22575 = $90.30 + $6150 x 0.8875% = $54.58
   Total Commission: $90.30 + 54.58 = $144.38
   Total Cost: $6150 + 144.88 = $6294.88

4. $6953.30
5. $143 312.40
6. $1383.75
7. $5904.00
8. $5287.98
9. $16 886.88
10. $31 127.25

5.

1. Gross Proceeds: $26.50 x 400 = $10 600. Because the shares are selling over $14 and under $30, the commission is 22.575 cents per share plus 0.8875% of the value of the order.
Commission: 400 x $0.22575 = $90.30 + $10 600 x 0.8875% = $94.08
Total Commission: $94.08 + 90.30 = $184.38
Net Proceeds: $10 600 - 184.38 = $10 415.62

2. Gross Proceeds: $0.92 x 1000 = $920.00. Because the shares are selling for under $14, the commission rate is 2.5% of the value of the order.
Commission: 920.00 x 2.5% = $23.00
Net Proceeds: $920.00 = $23.00 = $897.00

3. Gross Proceeds: $31.50 x 500 = $15 750. Because the shares are selling for over $30, the commission rate is 1.64% of the value of the order.
Commission: $15 750 x 1.64% = $258.30
Net Proceeds: $15 750 - $258.30 = $15 491.70

4. $15 697.50
5. $40 917.76
6. $2066.09
7. $3510
8. $1706.25
9. $19 475.28
10. $3631.88

6.

1. Purchase Price:
Cost: 100 x $15 - $1500
Commission: 100 x $0.22575 = $22.58 + $1500 x 0.8875% = $13.31
Total Commission: $22.58 + $13.31 = $35.89
Total Cost: $1500 + $35.89 = $1535.89

Selling Price:
Gross Proceeds: 100 x $13.50 = $1350
Commission: $1350 x 2.5% = $33.75
Net Proceeds: $1350 - $33.75 = $1316.25

Capital Loss: $1535.89 - 1316.25 = $219.64

2. Purchase Price:
Cost: $200 x $8.375 = $1675.00
Commission: $1675 x 2.5% = $41.88
Total Cost: $1675 + $41.88 = $1716.88

Selling Price:
Gross Proceeds: 200 x $12.25 = $2450
Commission: $2450 x 2.5% = $61.25
Net Proceeds: $2450 - $61.25 = $2388.75

Capital Gain: $2388.75 - $1716.88 = $671.87

3. Capital Gain: $1515.62
4. Capital Gain: $117.60
5. Yes, because of the commission involved,
6. Capital Loss: $48.43

7.

1. Annual dividend: .30 x 4 = $1.20
Total dividend: $1.20 x 100 = $120

2. Annual dividend: .50 x 2 = $1.00
Total dividend: $1.00 x 250 = $250

3. $1200
4. $264
5. $608
6. $1100
7. $610
8. $150
9. $240
10. $250

11. Dividend on 1 share: $100 x 8% = $8.00
Total dividend: 75 x $8.00 = $600.00

12. Dividend on 1 share: $50 x 5.5% = $2.75
Total dividend: 150 x $2.75 = $412.50

13. $2750
14. $2160
15. $2700
16. $1725

8.

1. 7.6%
2. 11.2%
3. 7.6%
4. 5%

5. Cost of stock: $57.50 × 100 = $5750
   Commission: $5750 × 1.64% = $94.30
   Total Investment: $5750 + $94.30 = $5844.30

   Annual dividend per share: $2.25 × 2 = $4.50
   Total dividends: $4.50 × 100 = $450

   Using the percent formula $A = R \times B$, we get $\$450 = R \times \$5844.30$
   Solving for R, we get a rate of return of 7.7%

6. 15.1%
7. 13.1%
8. 10.4%
9. 11.1%

B. BONDS

1\.

1. a) $980
   b) $967.50
   c) $1021.25
   d) $1031.25
   e) $863.75
   f) $997.50
   g) $1080
   h) $972.50
2. $18 650
3. $3845
4. $4712.50
5. $8170
6. $5368.75
7. $2925

2\.

1. $9497.25
2. $5193.34
3. $1533.88
4. $6489.79
5. $12 602.70
6. $4899.38
7. $8453.31

3\.

1. $510
2. $717.50
3. $1250
4. $196.88
5. $1140
6. $412.50
7. $45

8. Price of 1 Bond: $1000 x 88 1/2 = $885
Price of 4 Bonds: $885 x 4 = $3540
Commission: $3540 x .5% = $17.70
Total Investment: $3540 + $17.70 = $3557.70

Income from 1 Bond: $1000 x 9% = $90
Interest from 4 Bonds: $90 x 4 = $360.00

9. $5675.74, $600
10. $5251.13, $700
11. $10 160.55, $900
12. $7487.25, $760

4. 1. Price of Bond: $1000 x 96.125% = $961.25
Commission: $961.25 x .5% = $4.81
Total Investment: $961.25 + $4.81 = $966.06

Interest on Bond: $1000 x 9% = $90

Using A = R x B
90 = R x 966.06
90/966.06 = R
Therefore, the rate of return is equal to 9.3%.

2. 9.2%
3. 11.1%
4. 11.9%
5. 8.0%
6. 10.4%
7. 12.4%
8. The second bond pays 10.1%, while the first pays only 8.6%.
9. 8.1%
10. 12.5%

C. REAL ESTATE

1. 1. Annual Gross Income: $425 x 12 = $5100
Expenses:
a) Interest: $32 000 x 10% = $3200
b) Depreciation: $46 000 x 2% = $920
c) All other: $925
Total Expenses: $5045
Net Income: $5100 - $5045 = $55.00

2. Annual Gross Income: $440 x 12 x 2 = $10 560
Expenses:
a) Interest: $53 000 x 15% = $7950
b) Depreciation: $84 000 x 1.5% = $1260
c) Other: $1200
Total Expenses: $10 410
Net Income: $10 560 - $10 410 = $150.00

3. Annual Gross Income: $475 x 12 = $5700
Expenses:
a) Interest: $36 000 x 14% = $5040
b) Depreciation: $52 000 x 3% = $1560
c) Taxes: $760
d) Insurance: $151
Total Expenses: $7511
Net Loss: $7511 - 4700 = $1811

2. 1. a) 0.4%
b) 0.5%
c) -11.3%
2. One reason might be an expected capital gain.

Review Questions A

1 - 5. Answers will vary
6. $153.75
7. $9003.59
8. $34 760.88
9. $2040.33
10. $1052.50 Gain
11. $480
12. $500
13. 8.3%

Review Questions B

1. $869.33
2. $5864.18
3. $11 866.54
4. $475.00
5. 13.5%
6. 8.7%

Review Questions C

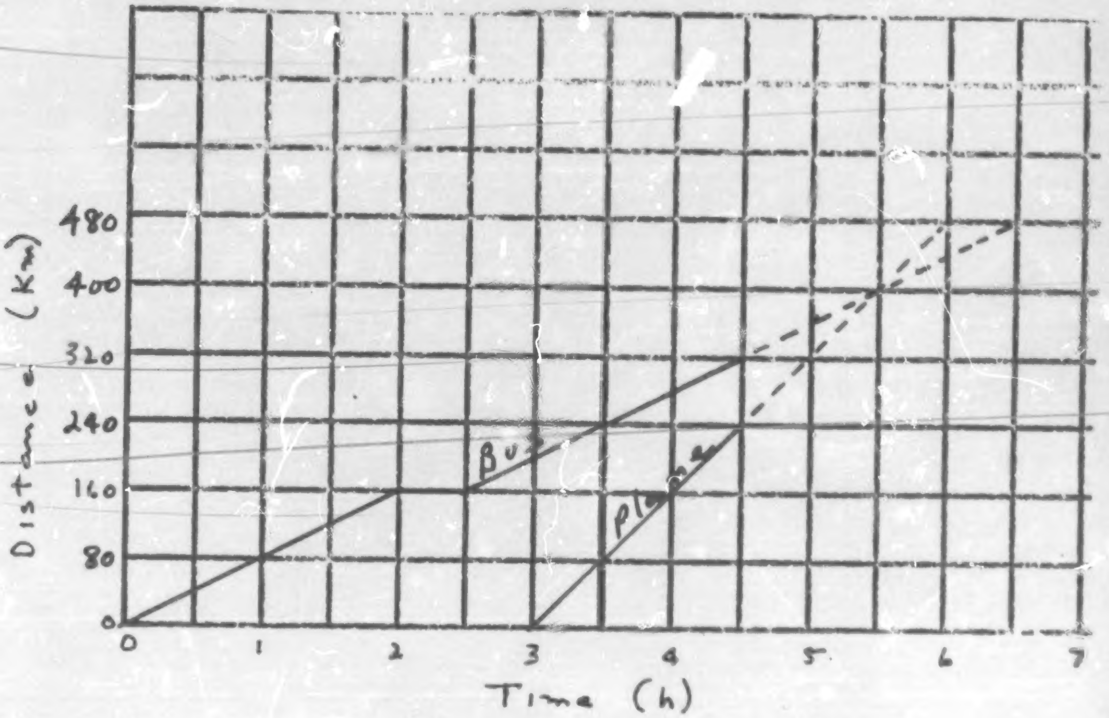
1. 25.2%

General Review Questions

1. $66.25
2. $10 516.90
3. $37 376.80
4. $1819.51 Loss
5. $240
6. $120
7. 11.1%
8. $989.93
9. $1020
10. 12.5%
11. 7.0%

OP.V. INTERPRETATION OF GRAPHS (1/2 MODULE)

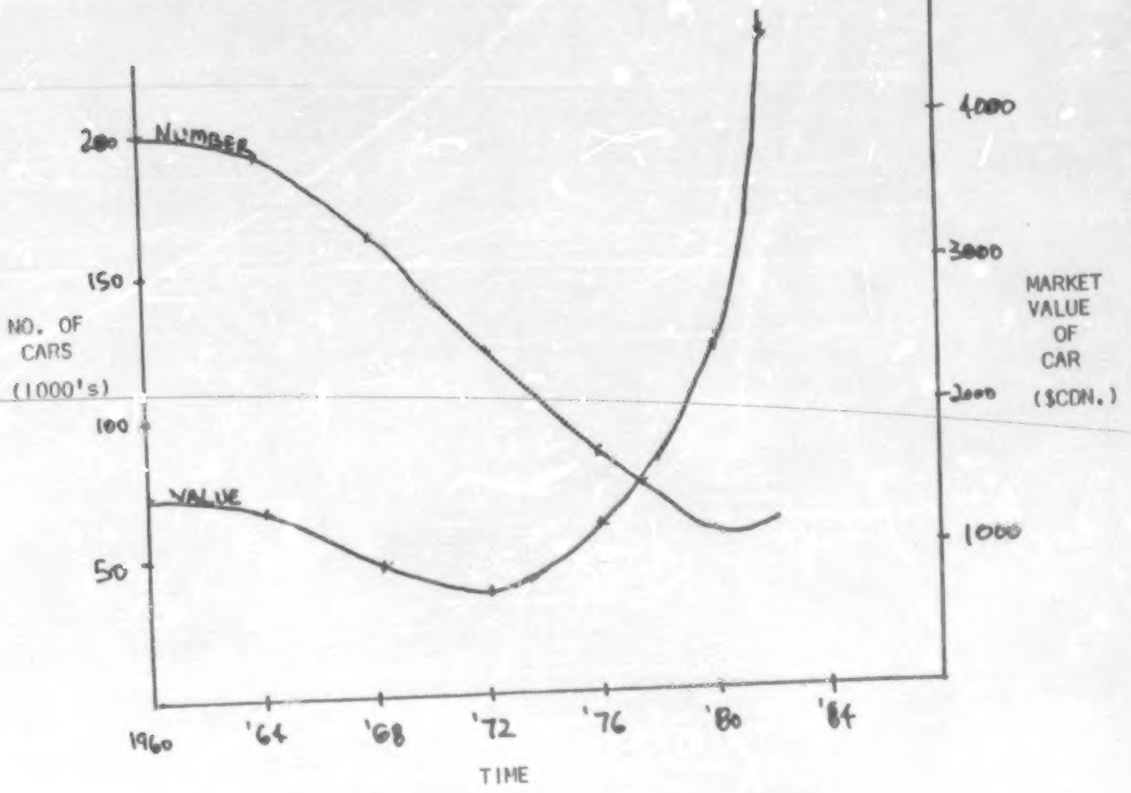
1.



A bus and an airplane have a journey of 480 km to be completed in 6 hours. The bus started at T_0, the airplane left 3 hours later. Answer the following questions.

a) How far had the bus gone after 1 1/2 hours? 4 hours?
b) After 4 1/2 hours of travel, which vehicle is travelling fastest? Prove your answer.
c) Assuming the speed of the bus and the plane remain constant, which will reach its destination on time? Justify your answer graphically.
d) What is the speed of the airplane?
e) What is the speed of the bus from T_0 to T_2? From $T_{2-1/2}$ to $T_{4-1/2}$?
f) How do we know the bus stopped?
g) What is the average speed of the bus for this travel shown?
h) What speed from $T_{4-1/2}$ to T_6 is necessary for the bus to reach its goal on time?
i) How is slope related to speed?
j) If the aircraft stopped for 1 hour, what speed would be necessary for it to reach its goal on time?

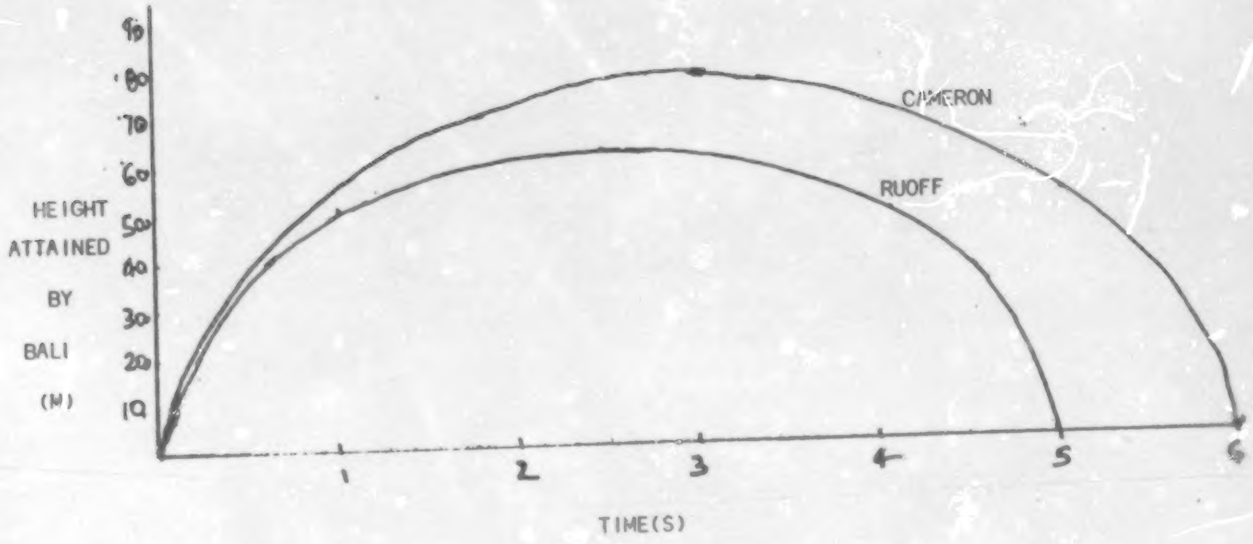
2.



The multiple line graph above indicates the number of existing 1960 M.G.s and the market value of those automobiles over a 22-year period. Answer the following:

a) What was the lowest price for which an M.G. could be purchased?
b) What do you estimate is the price in 1982?
c) Why did the value begin to increase for an M.G. after 1972?
d) Can you explain why the number of cars increased after 1980 if the car was no longer produced?
e) Explain the phrase, "Hedge Against Inflation." Could a 1960 M.G. be a hedge against inflation?
f) Why do you think M.G.s are no longer produced?
g) Can the 1980-82 price trend continue? Why?
h) Why was the car not considered to be more valuable until the mid-1970s?

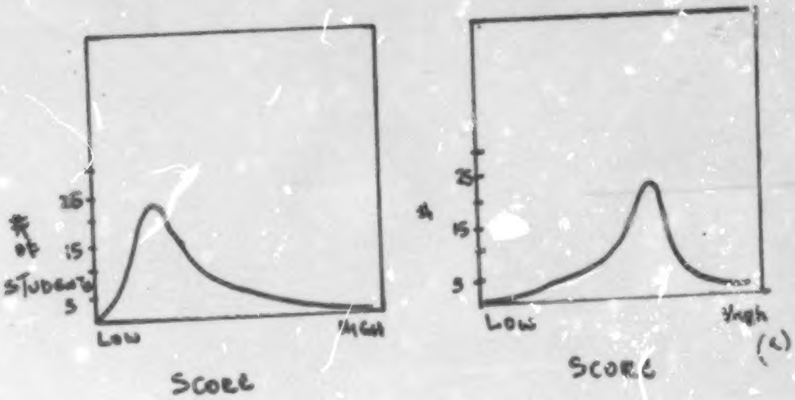
3.



The behaviour (vertical climb vs. time) of 2 kicked footballs is graphically shown above. The Cameron punt is in the air for 6 seconds, the Ruoff punt for only 5. Answer the following:

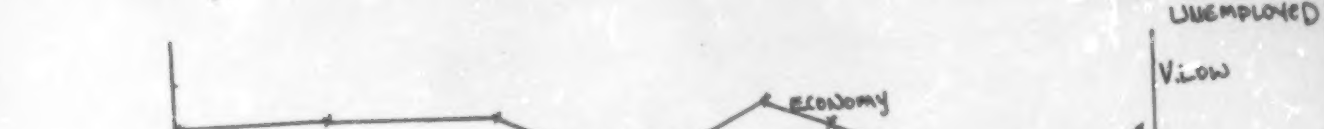
a) What is the difference in height attained by the 2 footballs?
b) Which football travelled faster when kicked? Justify your answer.
c) Show that each ball is slowing down in the first half of its journey, and accelerating in the last half.
d) What is the vertical velocity of the Cameron football at T_3? Of the Ruoff football at $T_{2.5}$?
e) Can the information above tell us the length of each kick?
f) After the half way point of the kick, each ball moves vertically according to free-fall physics; i.e., distance fallen = $1/2\ at^2$ where a = constant 9.8 and t = time in seconds. Calculate the vertical drop per second of each ball. Can you calculate rates of acceleration?

4.



These two distribution curves describe results of two spelling tests given the same class, one week apart. Interpret the graphs, indicating what you believe accounts for the shape.

5.

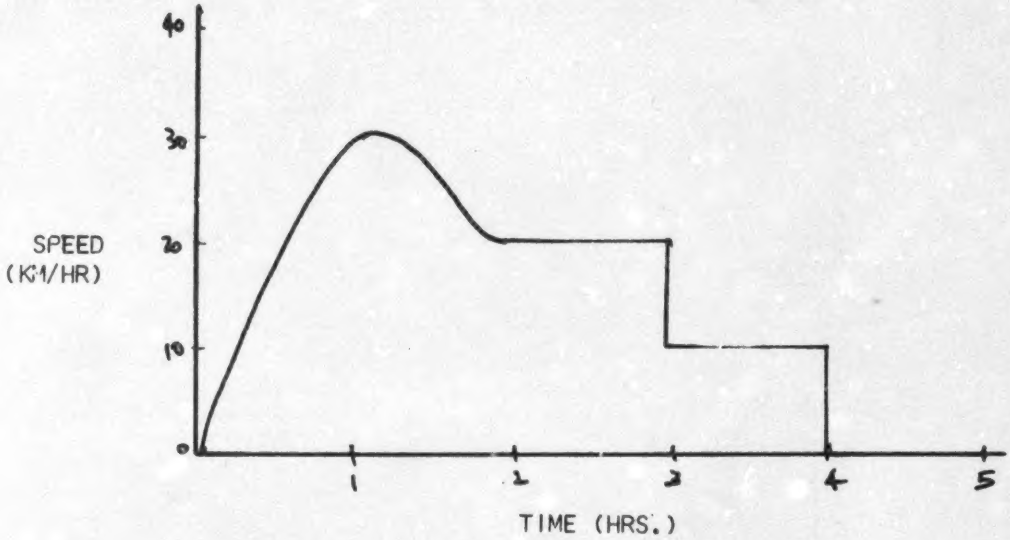


The preceeding line graph charts the number of game shows, games of chance, etc., available to viewers in a Canadian city, against the relative unemployment figures. From your analysis of the graph and knowledge of the period, answer the following questions.

a) Why was the economy good in 1950?
b) Why were there few game shows on T.V. in 1950?
c) Suggest reasons why the unemployment increased in the early 1960s and game shows increased.
d) Suggest reasons for higher unemployment after 1970.
e) After 1975, what major new trend occurred in games of chance?
f) State a possible generalized correlation between the number of unemployed and the number of games of chance.
g) Why was the economy shaken in the early 1960s?

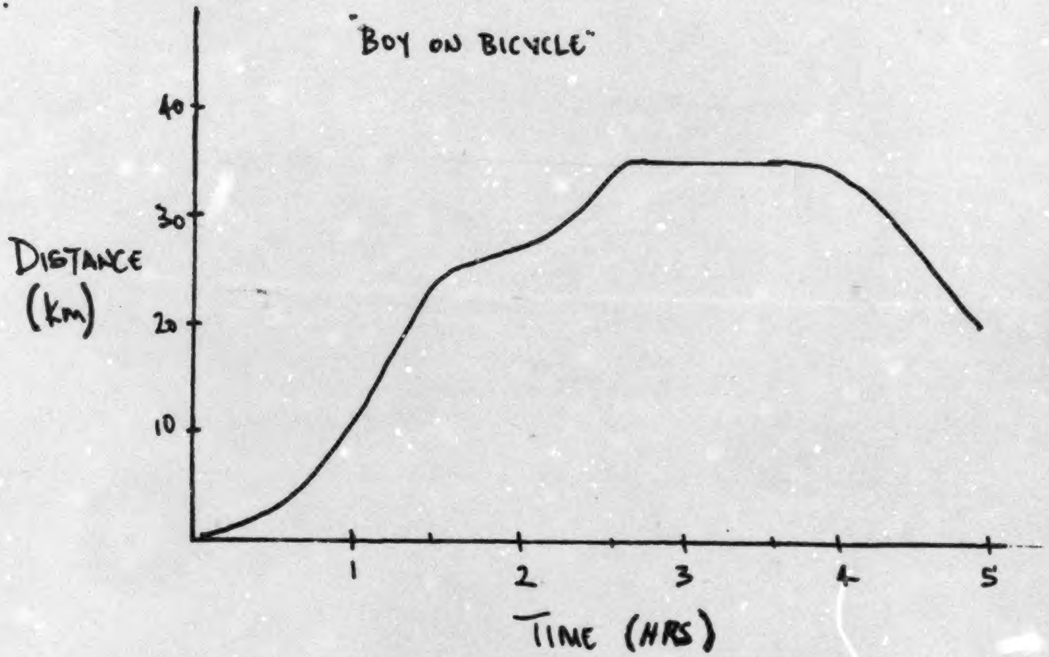
Note: The game of monopoly was created in the height of the depression.

6.



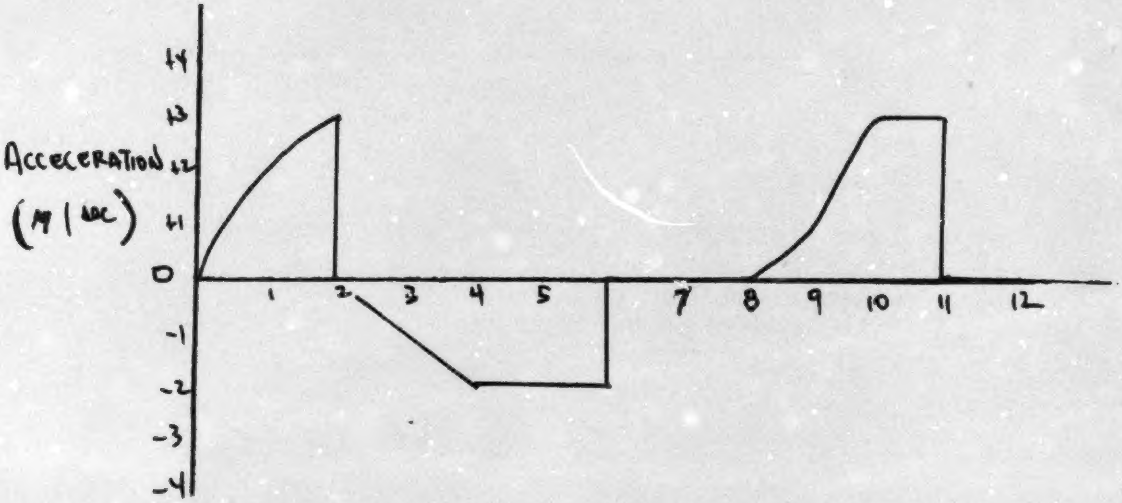
a) Estimate distance travelled.
b) Why did the graph drop at T_4?
c) Where are the periods of braking?
d) Calculate rate of acceleration from T_1 to T_2.

7.



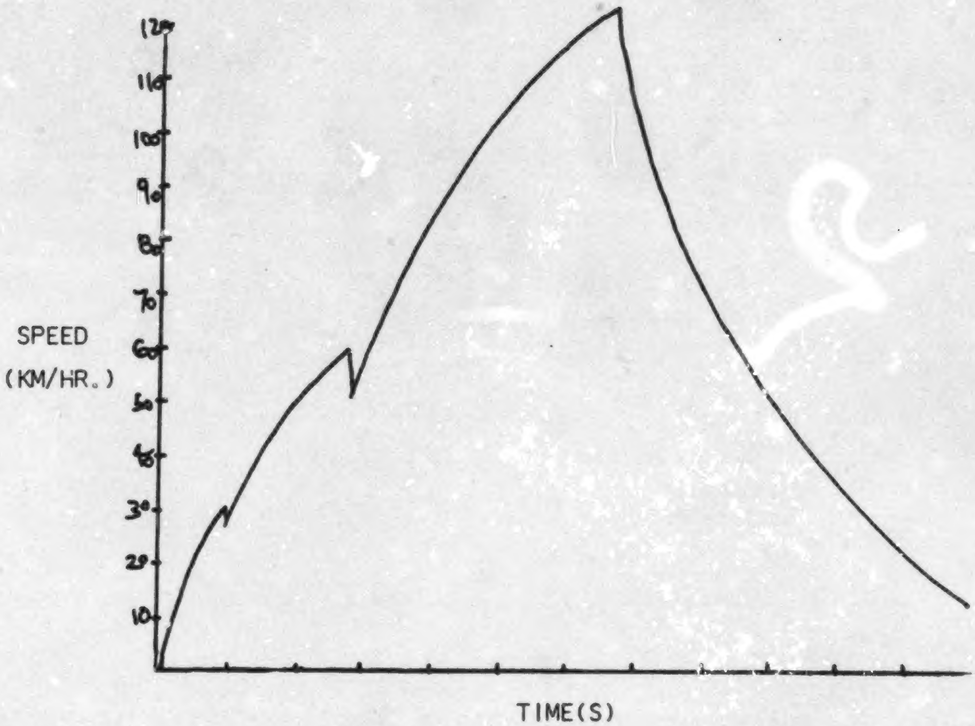
Describe what type of trip the boy is enjoying (consider road conditions, scenery, length of trip, etc.).

8.



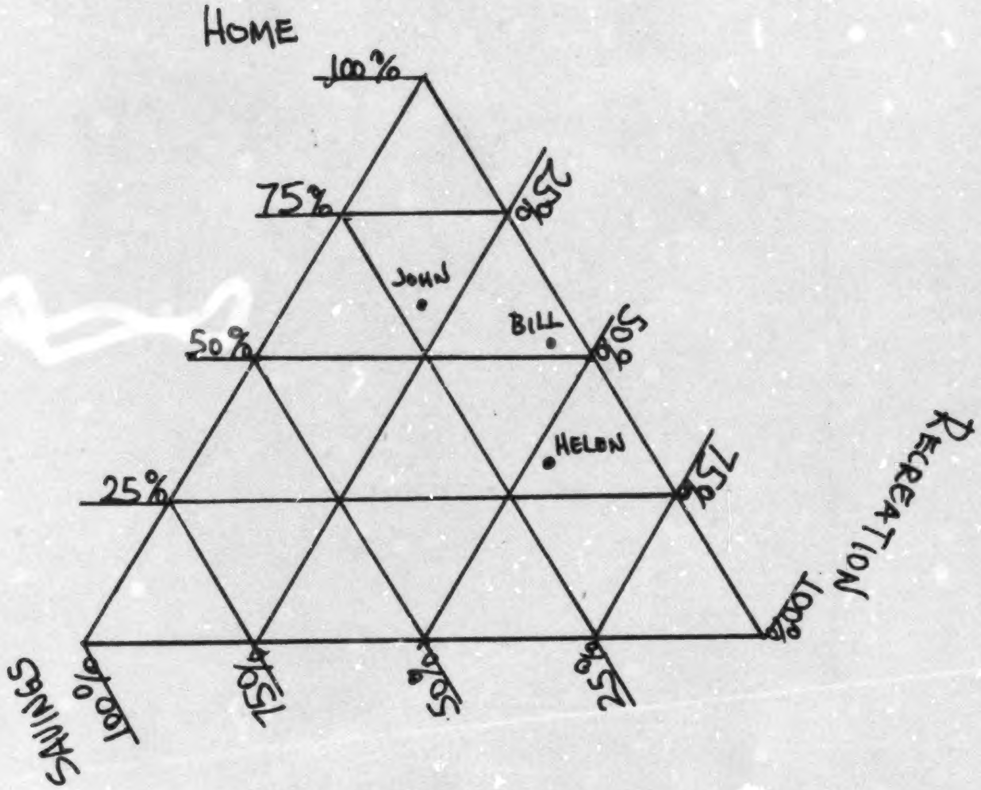
This graph represents acceleration, or the reverse, for a ball in a pinball game. Can you suggest what is happening to the ball?

9.



This graph represents a new, 4-speed automobile being tested. Can you suggest what happends?

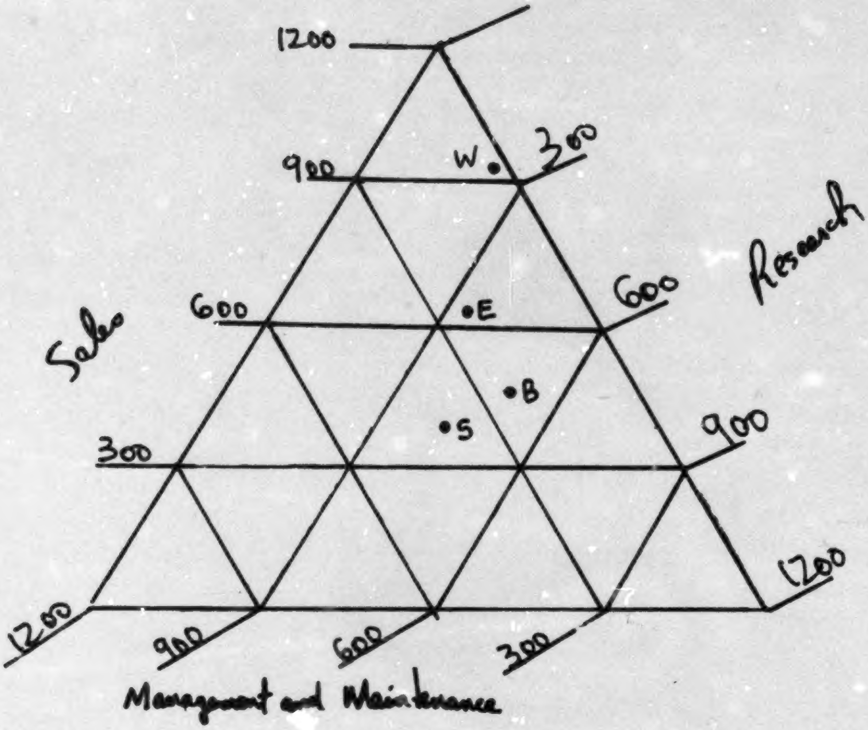
10.



The above graph indicates how three individuals spend net pay. Varying percent rates are spent on the home, recreation and savings.

a) What percent is spent by Helen on her home? savings?
b) What percent is spent by John on recreation? savings?
c) If Bill were to spend 25% on recreation, not touching home money, what is left for savings?
d) Without touching home money, if John spent nothing on recreation, what percent would go to savings?
e) If Helen had to spend 60 percent of her pay on her home, keeping her savings the same, what could she spend on recreation? Would that be a greater or lesser percent than she has been paying?

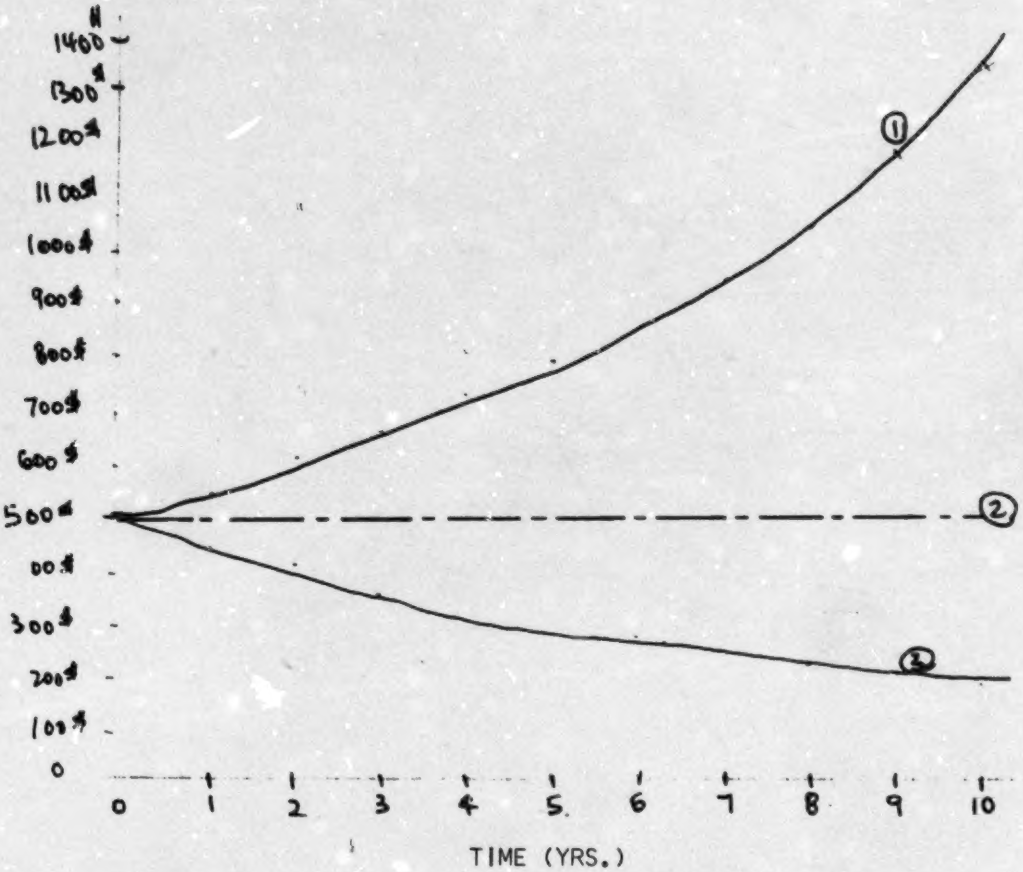
11.



The above graph represents how four major retail stores, Eaton's (E), The Bay (B), Sears (S), and Woolworths(W), employ people in various departments (sales, research, management and maintenance).

a) How many people are employed in different departments by Sears? How many in each department?
b) Which store employs the greatest number of people?
c) How many more work in management and maintenance for Woolworths than for The Bay?
d) What two stores have equal numbers of people in management and maintenance?
e) How many are in sales at Eaton's?
f) How many are in research at Sears?

12.



The above graph indicates the results of investing \$500 at 10% for 10 years (Line 1), and leaving \$500 alone (Line 2) where no interest is earned. As well, an inflation rate of 10% has reduced buying power of the original \$500 (Line 3).

a) What buying power has actually been lost over 10 years (between Lines 2 and 3)?
b) To what extent has the \$500 "earned" more money?
c) How much interest was earned after 3 years? 5 years?
d) What necessary information has not been included (i.e., can you detect any apparent illusion in this graph)?

OP.VI. QUADRATIC EQUATIONS (1/2 MODULE)

1. 1. Solve the following equations:

a) $5x^2 = 45$

b) $6x^2 = 96$

c) $7x^2 = 343$

d) $4x^2 - 36 = 0$

e) $16x^2 - 16 = 0$

f) $9x^2 - 4 = 0$

g) $25x^2 - 36 = 0$

h) $4x^2 - 20 = 0$

i) $4x^2 - 20 = 0$

j) $5x^2 - 75 = 0$

k) $8x^2 - 7 = 0$

l) $5m^2 - 6 = 0$

m) $-3x^2 + 23 = 0$

2. Solve the following quadratic equations, if possible. If there is no solution, indicate so.

a) $9x^2 - 1 = 0$

b) $\frac{1}{2}x^2 - 8 = 0$

c) $2x^2 - 8 = 0$

d) $5x^2 - 6 = 0$

e) $5x^2 + 6 = 0$

f) $4x^2 - 1 = 0$

g) $(2x + 1)(2x - 1) = 0$

h) $(x + 3)(2x - 6) = 0$

i) $x^2 + 4 = 0$

j) $5x^2 + 3 = 7$

k) $3x^2 - 4 = 1$

l) $2x^2 + 7 = 1$

m) $4x^2 + 9 = 9$

2. 1. Arrange the following in the $ax^2 + bx + c = 0$ order and state the value of a, b, and c for each.

a) $2x^2 + 6x + 9 = 0$

b) $6x^2 - 7x + 16 = 0$

c) $x^2 + 8x + 32 = 0$

d) $x^2 + 5x + 1 = 0$

e) $x^2 + x - 1 = 0$

f) $-4x^2 - 8x + 9 = 0$

g) $3x^2 + 6x = 13$

h) $-4x^2 = 9x + 4$

i) $9 = 3x^2 - 7x$

2. Arrange the following in the order $ax^2 + bx + c = 0$ and state the value of a, b and c for each.

a) $5 - 8x^2 = 6x$
b) $3 + 7x - x^2 = 0$
c) $2 + 5x^2 = 8x$
d) $(3x + 1)(2x - 7) = 0$
e) $(8x + 3)(2x + 5) = 0$
f) $(x - 7)(2x - 1) = 0$
g) $3(2x^2 + 6x) = 9$
h) $(x + 2)(x - 3) = (2x + 4)(3x - 1)$
i) $(2 - 5)(2x + 1) = (x + 7)(x - 7)$
j) $3(x + 5) + 4(x^2 - 3x) = 4(3x + 6)$
k) $5x(x + 6) = 3x(2x - 8) + 8$

3. Arrange the following in the order $ax^2 + bx + c = 0$ and state the value of a, b and c for each.

a) $6x^2 + 3 = 0$
b) $5x^2 - 8x = 0$
c) $-3x^2 = 7$
d) $4x^2 = -9$
e) $(2x + 3)(2x - 3) = 0$
f) $3x(x + 2) = 2x(x - 5)$
g) $x(x + 9) = 4x(2x - 3)$
h) $2(x + 3) - 4x(2x - 1) = (x + 1)^2$
i) $(2x + 3)^2 = (2x - 7)^2$
j) $(x + 1)(x + 1) = x^2 - 7$
k) $3(x + 2)^2 = 3(x - 2)(x + 4)$

3. 1. Use the quadratic formula to solve each of the following equations:

a) $6x^2 + 17x + 7 = 0$
b) $x^2 + 6x + 5 = 0$
c) $x^2 + 6x + 8 = 0$
d) $x^2 - 4x + 4 = 0$
e) $x^2 + 2x - 63 = 0$
f) $2x^2 - 3x - 14 = 0$
g) $6x^2 + x - 1 = 0$
h) $x^2 - 4x - 21 = 0$
i) $6x^2 + 19x - 7 = 0$
j) $10x^2 - 3x - 1 = 0$
k) $-6x^2 + 5x - 1 = 0$
l) $-5x^2 - 4x + 12 = 0$

2. Use the quadratic formula to solve each of the following equations:

a) $x^2 + 7x + 1 = 0$
b) $2x^2 - 6x - 1 = 0$
c) $3x^2 + 10x + 2 = 0$
d) $-4x^2 + 6x - 1 = 0$
e) $-7x^2 - 13x + 5 = 0$
f) $-3x^2 - 8x - 2 = 0$
g) $5x^2 + 2x - 3 = 0$
h) $-2x^2 + 1x + 4 = 0$
i) $7x^2 - 8x - 9 = 0$
j) $x^2 + x - 1/2 = 0$
k) $x^2 + 1/2x - 1/4 = 0$
l) $-1/2x^2 - 1/2x + 1/3 = 0$

3. Solve each of the following equations:

a) $x^2 - 8 = 0$

b) $3x^2 - 6 = 0$

c) $5x^2 - 50 = 0$

d) $-3x^2 + 25 = 0$

e) $4x^2 = 13$

f) $2x^2 - 3x = 0$

g) $x^2 + 4x = 0$

h) $x^2 - 6x = 0$

i) $1/2x^2 + 8x = 0$

j) $3x^2 = 7x$

k) $-2x^2 = 6x$

l) $1/4x^2 = 1/8x$

4. 1. Write an equation for each of the following problems and then solve. Indicate what each variable represents.

a) A rectangle has a perimeter of 42 cm and an area of 104 cm^2. Find its dimensions.

b) Find two consecutive integers whose product is 182.

c) If a number is added to its square, the result is 462. Find the number.

d) The product of two consecutive even integers is 728. Find the integers.

e) What are the dimensions of a badminton court whose area is 98 m^2 and whose length is twice its width?

f) The width of a rectangle is 7 cm shorter than its length and 8 inches shorter than its diagonal. How long is the diagonal?

g) The height of an object, h, shot vertically upward with an initial velocity, v, is given by the formula $h = vt - 16t^2$, where t is the time in seconds. If an object is shot upward with an initial velocity of 96 m/sec, in how many seconds will it be (i) 144 m above the ground? (ii) 140 m above ground?

h) For a given right triangle, it is known that the hypoteneuse is 1 unit longer than one of the legs and 18 units longer than the other leg. How long are the sides of the triangle?

i) Three boys share the cutting of a lawn by beginning at the outer edge and travelling around the rectangular shaped lawn. (a) If the lawn measures 40 m by 90 m, how wide a strip must the first boy mow so that he does his 1/3 share? (b) How wide a strip must the second boy do to get his 1/3 share done?

j) A 5 cm square is cut from each corner of a square piece of tin, and then each side is folded up to form an open box which has a volume of 845 cm^3. Find the dimensions of the original piece of tin.

k) A rectangular piece of tin is 10 cm shorter than its length. A four-inch square is cut from each corner, and the sides are turned up to form an open box of volume 684 cm^3. Find the dimensions of the original piece of tin.

l) The sum of a number and its reciprocal is 4. Find the number.

m) Find the length of a side of a square if the number of square centimetres in its area is twice the number of centimetres of its perimeter.

n) Over the past 2 years the price of shirts has risen \$6 each so that 4 less shirts can now be purchased for \$144 than 2 years ago. What price do shirts sell for today?

o) The altitude of a triangle is 6 times the length of the base. The area of the triangle is 75 cm. Find the length of the base and of the altitude.

p) The sum of the areas of two squares is 106 cm^2. The side of one square is 4 cm more than that of the other square. Find the side of the smallest square.

q) The base of a triangle is 8 cm less than the altitude. The area of the triangle is 42 cm. Find the measure of the base.

r) In a right-angled triangle, one side is 8 cm shorter than the hypotenuse. The second side is 1 cm shorter than the hypotenuse. Find the sides of the triangle.

s) The sum of the squares of three consecutive integers is 245. Find the integers.

t) The sum of the squares of three consecutive even integers is 308. Find the integers.

OP.VI. QUADRATIC EQUATIONS - ANSWERS

1.

1. a) $x = \pm 3$
b) $x - \pm 4$
c) $x = \pm 7$
d) $x = \pm 3$
e) $x = \pm 1$
f) $x = \pm 2/3 \doteq \pm 0.67$
g) $x = \pm 6/5 = \pm 1.2$
h) $x = \pm\sqrt{5} \doteq \pm 2.24$
i) $x = \pm 3/2 = \pm 1.5$
j) $x = \pm\sqrt{15} \doteq \pm 3.87$
k) $x = \pm\sqrt{7/8} \doteq \pm 0.94$
l) $m = \pm\sqrt{6/5} \doteq \pm 1.10$
m) $x = \pm\sqrt{23/3} \doteq \pm 2.77$

2. a) $x = \pm 1/3 \doteq \pm 0.67$
b) $x = \pm 4$
c) $x = \pm 1/4 = \pm 0.25$
d) $x = \pm\sqrt{6/5} \doteq \pm 1.10$
e) no solution; imaginary
f) $x = \pm 1/2 = \pm 0.5$
g) $x = \pm 1/2 = \pm 0.5$
h) $x = \pm 3$
i) no solution
j) $x = \pm\sqrt{4/5} \doteq \pm 0.89$
k) $x = \pm\sqrt{5/3} \doteq \pm 1.29$
l) no solution
m) $x = 0$

2.

1. a) 2, 6, 9
b) 6, -7, 16
c) 1, 8, 32
d) 1, 5, 1
e) 1, 1, -1
f) -4, -8, 9
g) $3x^2 + 6x - 13 = 0$; 3, 6, -13
h) $4x^2 + 9x + 4 = 0$; 4, 9, 4
i) $3x^2 - 7x - 9 = 0$; 3, -7, -9

2. a) $8x^2 + 6x - 5 = 0$; 8, 6, -5
b) $x^2 - 7x - 3 = 0$; 1, -7, -3
c) $5x^2 - 8x + 2 = 0$; 5, -8, 2
d) $6x^2 - 19x - 7 = 0$; 6, -19, -7
e) $16x^2 + 46x + 15 = 0$; 16, 46, 7
f) $2x^2 - 15x + 7 = 0$; 2, -15, 7
g) $2x^2 + 6x - 3 = 0$; 2, 6, -3
h) $5x^2 + 11x + 2 = 0$; 5, 11, 2
i) $x^2 - 9x + 44 = 0$; 1, -9, 44
j) $4x^2 - 21x - 9 = 0$; 4, -21, -9
k) $x^2 - 54x + 8 = 0$; 1, -54, 8

3\.
a) $6x^2 + 0x + 3 = 0$; 6, 0, 3
b) $5x^2 + -8x + 0 = 0$; 5, -8, 0
c) $3x^2 + 0x + 7 = 0$; 3, 0, 7
d) $4x^2 + 0x + 9 = 0$; 4, 0, 9
e) $4x^2 + 0x - 9 = 0$; 4, 0, -9
f) $x^2 + 16x + 0 = 0$; 1, 16, 0
g) $7x^2 - 21x + 0 = 0$; 7, -21, 0
h) $9x^2 - 4x - 5 = 0$; 9, -4, -5
i) $0x^2 + 40x - 40 = 0$; 0, 40, -40
j) $0x^2 + 2x + 8 = 0$; 0, 2, 8
k) $0x^2 + 6x + 36 = 0$; 0, 6, 36

3.

1\.
a) $-\frac{1}{2}$
b) -1, -5
c) -2, -4
d) +2
e) 7, -9
f) 7/2, -2
g) 1/3, $-\frac{1}{2}$
h) 7, -3
i) 1/3, -3 1/2
j) $\frac{1}{2}, -\frac{1}{5}$
k) 1/3, 1/2
l) -2, 6/5

2\.
a) -0.15, -6.85
b) $\frac{3}{2}, \pm\frac{\sqrt{11}}{2}$
c) -0.214, -3.12
d) $\frac{3}{4}, \pm\frac{\sqrt{5}}{\sqrt{4}}$
e) -2.184, -0.327
f) $\frac{-4\pm\sqrt{10}}{3}$
g) 3/5, -1
h) -1.19, 1.69
i) $\frac{4}{7}, \pm\frac{3\ 6}{7}$
j) -1.366, 0.37
k) $-\frac{1}{4}, \pm\frac{\sqrt{5}}{4}$
l) -1.46, 0.46

3\.
a) $\mp 2\sqrt{2}$
b) ∓ 1.414
c) $\mp \sqrt{10}$
d) ∓ 2.885
e) $\mp\frac{\sqrt{13}}{2}$
f) 3/2, 0
g) -4, 0
h) 6, 0
i) -16, 0
j) 14/3, 0
k) -3, 0
l) 1/2, 0

4.

1\.
a) $L^2 - 21L + 104 = 0$; L = 13, W = 8
b) $x^2 + x - 182 = 0$; 13, 14
c) $x^2 + x - 462 = 0$; 21, -22
d) $x^2 + 2x - 728 = 0$; 26, 28; -28, -26
e) $2W^2 - 98 = 0$; W = 7; L = 14
f) $L^2 - 16L + 48 = 0$; Diag = 13

g) i) $16t^2 - 96t + 144 = 0$ $t = 3s$
ii) $16t^2 - 96t + 140 = 0$ $t = 2.5s$ and $3.5s$
h) $x^2 - 38x + 325 = 0$; $x = 25$, $x - 1 = 24$, $x - 18 = 7$
i) a) $x^2 - 65x + 300 = 0$ $x = 5$
b) $(80 - 2x)(30 - 2x) = 1/2(30)(80)$
$4x^2 - 220x + 1200 = 0$ $x = 6.36$
j) $x^2 - 10x - 144 = 0$ $x = 18$
k) $4(x - 8)(x - 18) = 684$ $x = 27$
l) $x + \frac{1}{x} = 4$; $x^2 - 4x + 1 = 0$ $x = 3.73, 0.27$
m) $L^2 - 8L + 0 = 0$ $L = 8$
n) $P^2 - 6P - 216 = 0$ $P = 18$
o) base = 5 altitude = 30
p) 5
q) 6
r) 5, 12, 13
s) 8, 9, 10 or
t) 8, 10, 12

OP.VII. PERMUTATIONS AND COMBINATIONS

A-1,2,
3,4.

1. Write all the possible permutations of the letters A, T and R. Repetitions of a letter are not permitted.

2. Write all possible three-digit numbers that can be formed from the digits 1, 2, 3 and 4. No digit may be repeated within a number.

3. Fasar Analog watches may be obtained as Ladies' or Gents' models; in yellow or white; with a leather or link bracelet; and with 2, 4, 6 or 8 diamonds in the case. Construct a tree diagram to illustrate the possible watches in stock at the factory.

4. A penny, a nickel, a dime and a quarter are tossed consecutively. In how many ways can heads or tails appear?

5. How many 3-digit numbers can be formed using the digits 2, 4, 6, 8, if no digit may be repeated?

6. The football stadium has 4 entrances and 8 exits. In how many ways can Crazy George a) enter and leave the stadium, b) enter and leave by a different exit?

7. In how many ways can four candidates for council president be listed on the ballot?

8. How many more different licence plates can be manufactured if licence plates had to have four letters and two numerals instead of three letters and three numerals?

9. If 9 runners are entered in the 100 m sprint at the Pan Am stadium, how many arrangements of first, second and third place could there be?

10. How many odd numbers consisting of three different digits can be formed from the numerals 1, 2, 3, 4, 5, 6 and 0?

11. In how many ways can a) one die land? b) two dice land?

12. In how many ways can 6 people be seated in a row?

13. In how many ways can 5 men and 5 women be seated in a row, a) if men and ladies must alternate? b) if the ladies must be seated in the first four seats?

14. How many different compositions can be played on a xylophone, striking each of eight keys once only?

15. How many different telephone numbers are there on the same exchange if in an exchange the first group of three digits are identical?

A-5,6,7. 1. If $5! = 5 \times 4 \times 3 \times 2 \times 1$ and $0! = 1$, evaluate the following:

a) $4!$
b) $8!$
c) $\frac{5!}{(5-2)!}$
d) $\frac{6!}{6!}$
e) $4! \times 3!$
f) $\frac{5! \times 2!}{4!}$
g) $69!$
h) $7! \times 0!$
i) $\frac{3!}{0!}$
j) $6 \times 3!$

2. Why do most calculations with a factorial function not give a read-out for 70!?

3. If $nPr = \frac{n!}{(n-r)!}$ determine

a) ${}_5P_2$
b) ${}_{100}P_2$
c) ${}_{15}P_5$
d) ${}_{10}P_2$
e) ${}_5P_3 \times {}_6P_2$
f) $3! \times {}_5P_1$

4. Using the formula ${}_nP_r = \frac{n!}{(n-r)!}$ calculate the number of 3 different digit numbers that can be formed from the numerals 1, 2, 3, 4, 5, 6 and 7.

5. In how many ways can a president, vice-president, treasurer and secretary be chosen from a group of 6 candidates?

6. Winners for the school raffle prizes of $1000 for first and $500 for second are to be drawn from a barrel containing 8000 ticket stubs. How many possible orders of winners can there be?

7. In how many ways can 10 commercial floats be arranged in the Shannon Festival Parade?

8. In how many ways can the letters of the word "ALTER" be arranged?

9. In how many different ways can AA be arranged if one is coloured red and the other is black?

10. How many arrangements of the letters of the word "ALTAR" are there if the A's are indistinguishable from each other?

11. How many permutations of the letters of each of the following words are there?
    a) EGOTISTICAL
    b) ARKANSAS
    c) SPECIFICITY
    d) LULL

12. How many different arrangements are there of 4 black marbles, 3 white marbles and 5 red marbles?

13. In how many different-looking ways can three sets of identical twins be lined up along the end line of the volleyball court if no one can tell each pair of twins apart and if none of them have identifying numbers or names on their uniforms?

B-1,2.

1. Evaluate a) ${}_9C_6$ b) ${}_{15}C_7$ c) ${}_{15}C_8$ d) ${}_{10}C_7$ e) ${}_{10}C_3$

2. In how many ways can 3 people from a group of 8 be chosen to form a committee?

3. How many diagonals does a regular octagon (8-sided) have? (Are some of the segments sides?)

4. The school team, consisting of four curlers, is to be awarded sweaters before the provincial bonspiel. Each sweater is to consist of two of the following colours: blue, orange, white, green, purple and black. How many different combinations of two colours can there be for a sweater?

5. The student council, consisting of 8 male and 6 female students, wishes to set up a committee consisting of 3 males and 2 females to conduct a survey: "Should teenage girls receive preferential driver licence rates?" a) How many such 5-member committees are possible? b) How many such committees would be possible if the council determined that the male members must be in majority? (enrichment)

6. After the basketball game, the players dropped in at the nearest fast-food outlet, where Wendy, the waitress, stated that their Big Hamburgers could have a choice of cheese, lettuce, onions or pickles in a toasted caraway seed bun. How many different orders could there be?

7. How many combinations of 3 letters can be selected from the word "terminal"?

8. How many permutations of 3 letters can be selected from the word "terminal"?

9. Jim Average came to class (again) without pens. Margaret offered him any 2 from her set of 8 pens. In how many ways can he choose two pens to use during class?

10. The volleyball conference consists of 7 teams. Each team plays each other team twice before playoffs. How many volleyball games are played?

11. Dominoe tiles are either blank or marked with 1 to 9 spots in a "double-nine" set. a) How many dominoe tiles are in a double-nine set? b) How many dominoe tiles are in a "double-six" set?

12. How many different 5-card poker hands are possible from an ordinary deck of 52 cards?

13. On a test, students are instructed to answer only 6 questions of 10. What is the greatest number of students who could write the test so that each student has a different set of 6 questions answered?

OP.VII. PERMUTATIONS AND COMBINATIONS - ANSWERS

-1,2, 3,4,

1. ATR, ART, TRA, TAR, RAT, RTA

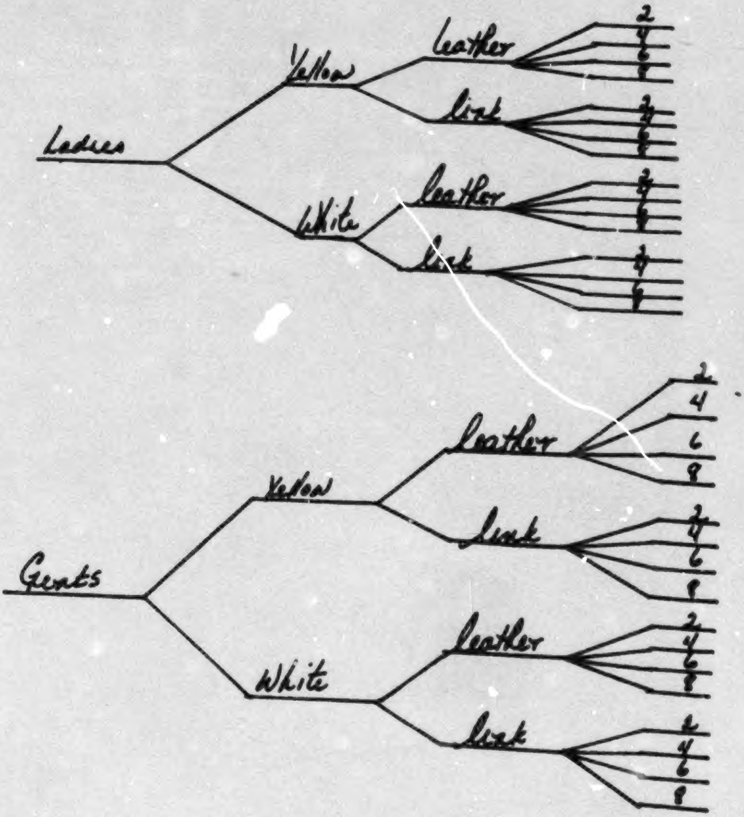
2. 123
132
231
213
312
321

234
243
342
324
423
432

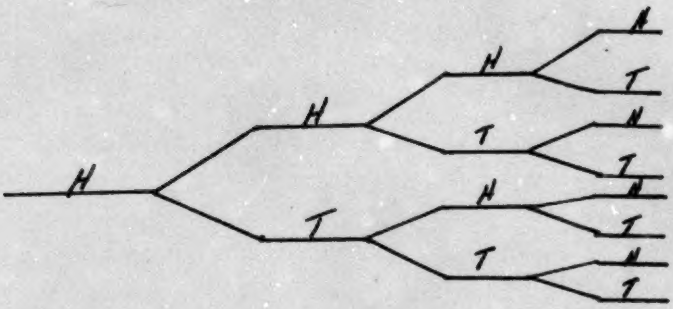
134
143
341
314
413
431

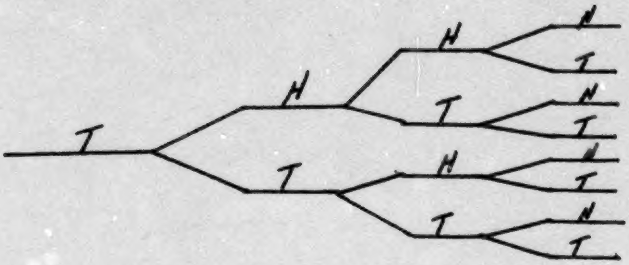
124
142
241
214
412
421

3.


Ladies
Yellow
leather
2
4
6
8
link
2
4
6
8
White
leather
2
4
6
8
link
2
4
6
8
Gents
Yellow
leather
2
4
6
8
link
2
4
6
8
White
leather
2
4
6
8
link
2
4
6
8

4. Each coin lands either heads or tails.





5. 4 x 3 x 2 = 24 possible three different digit numbers.

6. 4 x 8 = 32 ways
4 x 7 = 28 ways

7. 4 x 3 x 2 x 1 = 24 ways

8. 26 x 26 x 26 x 26 x 10 x 10 = 45 697 600
26 x 26 x 26 x 10 x 10 x 10 = 17 576 000
Difference = 28 121 600

9. 9 x 8 x 7 = 504 arrangements

10. 5 x 5 x 3 = 75
The final digit must be odd, therefore, 3 choices. The first digit cannot be zero nor the odd digit chosen for the final digit, therefore five choices. For the middle digit, there is a choice of five since two digits have already been chosen.

11. a) 6
    b) $6 \times 6 = 36$

12. $6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$

13. a) $\frac{5}{M} \times \frac{4}{L} \times \frac{4}{M} \times \frac{3}{L} \times \frac{3}{M} \times \frac{2}{L} \times \frac{2}{M} \times \frac{1}{L} \times \frac{1}{M} = 2880$

    b) $\frac{4}{L} \times \frac{3}{L} \times \frac{2}{L} \times \frac{1}{L} \times \frac{5}{M} \times \frac{4}{M} \times \frac{3}{M} \times \frac{2}{M} \times \frac{1}{M} = 2880$

14. $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 40\ 320$

15. Same for all 10 9 8 7 = 5040

A-5,6,7

1. a) 24
   b) 40 320
   c) 20
   d) 1
   e) 144
   f) 10
   g) $\approx 1.71 \times 10^{98}$
   h) 5040
   i) 6
   j) 36

2. 70! would be a very large number with more than 100 digits in the answer. If the calculator cannot register an exponent greater than 99 the display will print "Error."

3. a) $\frac{5!}{3!} = 20$
   b) $\frac{100!}{98!} = 100 \times 99 = 9900$
   c) $\frac{15!}{1!} = 360\ 360$
   d) $\frac{10!}{6!} = 5040$
   e) $\frac{5!}{2!} \times \frac{6!}{4!} = 1800$
   f) $6 \times \frac{5!}{4!} = 30$

4. ${}_7P_3 \approx \frac{7!}{(7-3)!} = \frac{7 \times 6 \times 5 \times 4!}{4!} = 210$

5. Since order counts ${}_6P_4 = \frac{6!}{(6-4)!} = 6 \times 5 \times \frac{4 \times 3 \times 2!}{2!} = 360$

6. ${}_{8000}P_2 \approx \frac{8000!}{(8000-2)!} = \frac{8000!}{7998!} = 8000 \times 7999 \times \frac{7998!}{7998!} = 63\ 984\ 000$

7. Choose 10 out of 10 ${}_{10}P_{10} = \frac{10!}{(10-10)!} = \frac{10!}{0!} = 3\ 628\ 800$

8. ${}_5P_5 \approx \frac{5!}{0!} = 120$ or $5 \times 4 \times 3 \times 2 \times 1$

9. If the two A's are different, the letters could be arranged in two different ways.

10. $\frac{5!}{2!} = 5 \times 4 \times \frac{3 \times 2 \times 1}{2} = 60$ ways

11. a) $\frac{11!}{2!2!} = 9\ 979\ 200$

b) $\frac{8!}{3!2!} = 3360$

c) $\frac{11!}{2!3!} = 3\ 326\ 400$

d) $\frac{4!}{3!} = 4$

12. $\frac{12!}{4!3!5!} = 27\ 720$

13. $\frac{6!}{2!2!2!} = 90$

B-1,2

1. a) 84 b) 6435 c) 6435 d) 120 e) 120

2. ${}_8C_3 = \frac{8!}{5!3!} = \frac{8 \times 7 \times 6 \times 5}{2 \times 3 \times 5} = 56$ ways or $\frac{8 \times 7 \times 6}{3 \times 2 \times 1} = 56$

3. Number of segments joining two points ${}_8C_2 = \frac{8!}{6!2!} = 28$

But 8 of these segments are sides. Therefore, 28-8=20 diagonels.

4. ${}_6C_2 = \frac{6!}{4!2!} = 15$ combinations

5. a) ${}_8C_3 \times {}_6C_2 = \frac{8!}{5!3!} \times \frac{6!}{4!2!} = 840$ committees

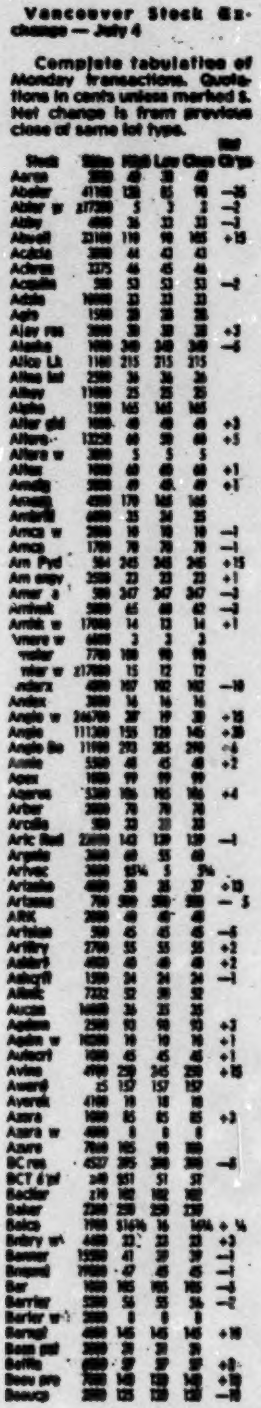
b) ${}_8C_3 \times {}_6C_2 + {}_8C_4 \times {}_6C_1 + {}_8C_5 \times {}_6C_0 = 840 + 420 + 56 = 1316$

6. ${}_4C_0 + {}_4C_1 + {}_4C_2 + {}_4C_3 + {}_4C_4 =$
Plain the works
$1 + 4 + 6 + 4 + 1 = 16$

7. 56
8. 336
9. 28
10. $2 \cdot {}_7C_2 = 42$

11. a) 55 b) 28
12. 2 598 960
13. 210

OP. VIII. STATISTICS (STANDARD DEVIATION AND THE NORMAL CURVE)



Vancouver Stock Exchange — July 4

Complete tabulation of Monday transactions. Quotations in cents unless marked $. Net change is from previous close of same lot type.

1. From the listing of closing prices of the stocks in the given table:

   a) Group the data into classes, construct a frequency table, and calculate the mean (x) and standard deviation ( ) of the closing prices.

   - Use 9 classes beginning with 2.5 - 58.5 and a class interval of 56.

   b) Construct a histogram of the results.

   c) How many of the stocks are within 1 s.d. of the mean? Is this a normal distribution? Considering this percent and your graph, make a meaningful statement regarding this sample and results.

2. On a mechanical aptitude test, John received a mark which placed him at the 84th percentile. How many standard deviations was he from the mean, assuming a normal distribution?

3. On an I.Q. test, the mean is 105 and the standard deviation is 20, assuming a normal distribution.

   a) If your I.Q. is 135, what percent of the population has a higher I.Q. than you?

   b) A student has an I.Q. of 85. What percent of the population has a lower I.Q.?

   c) Hi Kiw has an I.Q. in the 98th percentile. What is his I.Q.?

4. The Everglow Match Company makes boxes of wooden matches advertised to contain at least 50 matches in a box. The company has determined that the number of matches in its boxes follows a normal distribution pattern with a mean of 53 matches to a box and a standard deviation of 3 matches.

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a) What percent of the boxes made will contain less than 50 matches?
b) If 40 000 boxes are made each day, how many boxes per day will contain less than 50 matches?
c) How many boxes per day will contain more than 59 matches?

5. The Allways Lit Battery Company manufactures batteries for flash attachments on cameras. The batteries have an average life of 30 hours with a standard deviation of 3 hours.

a) What percent of the batteries will have a life less than 27 hours?
b) What percent of the batteries will have a life greater than 36 hours?
c) What percent of the batteries will have a life greater than 27 hours but less than 36 hours?

6. Use the statistical information given below for two hockey teams, Team "A" and Team "B", to answer the following questions.

SEASON
1982 - 1983

TEAM "A"	HT. (cm)	MASS (kg)	TEAM "B"	HT. (cm)	MASS (kg)
FORWARDS			FORWARDS		
1	188	82	1	175	79
2	180	85	2	173	79
3	183	88	3	183	77
4	180	77	4	178	88
5	180	79	5	183	86
6	173	75	6	175	82
7	183	88	7	188	84
8	178	83	8	183	84
9	185	80	9	183	88
10	191	88	10	188	88
11	183	84	11	191	91
12	178	79	12	185	77
			13	180	82
DEFENCEMEN			DEFENCEMEN		
13	185	79	14	178	87
14	183	82	15	185	91
15	183	91	16	175	91
16	173	84	17	185	86
17	183	84	18	185	84
18	185	86	19	183	88
19	191	88			
GOALIES			GOALIES		
20	191	88	20	183	82
21	183	82	21	175	70

a) Construct a table and calculate the mean and standard deviation for both teams.

   i) For the heights, use 172.5 - 175.5, class width of 3 and number of classes 7

   ii) For the masses, use 69.5 - 72.5, class width 3 and number of classes 8

   iii) Construct a histogram of each of the heights and weights for both teams.

b) Approximately how many players are there within 1 standard deviation of the mean?

   i) for height
   ii) for mass

7. A football coach graphed the masses of his players and found a normal distribution. The mean was 105 kg and the s.d. was 10 kg.

   a) What percent of the players have masses between 95 and 115 kg?
   b) What percent of the players have masses between 75 and 125 kg?
   c) What percent of the players have masses over 125 kg?

8. The local hospital found that the average stay for maternity cases is 4 days with a standard deviation of 1. Assuming a normal distribution:

   a) What percent of mothers stay in the hospital between 3 and 5 days?
   b) What percent of mothers stay in the hospital between 2 and 6 days?
   c) What percent of the mothers stay less than 5 days?

9. The provincial government bought 10 000 Mark Y tires from the YZ Tire Co. The company claims that the Mark Y has a mean life of 140 000 km, with a standard deviation of 15 000 km. Assuming a normal distribution:

   a) What percent of the tires will last between 125 000 - 170 000 km?

   b) What percent of the tires will wear out in less than 155 000 km?

   c) How many tires will last more than 155 000 km?

   d) How many tires will last less than 12 [illegible] km?

Review Questions

1. A factory ordered 1000 light bulbs from the Brite-Lite Company. The company claimed that the mean life of the bulbs was 900 h with a standard deviation of 100 h. Assuming a normal distribution:

   a) What percent of the bulbs will last between 800 h and 1000 h?

   b) What percent of the bulbs will last longer than 700 h?

   c) How many bulbs could be expected to last over 1000 h?

   d) How many bulbs will last longer than 1100 h?

2. The personnel manager of a factory employing 2000 people found that the average term of employment was 20a with a standard deviation of 7a. Assuming a normal distribution:

   a) What percentage of the employees will work more than 13a?

   b) How many employees will work between 13 and 27a?

   c) How many people will work less than 6a?

   d) How many employees will work longer than 27a?

3. The quality controller at a candy factory finds that the mean mass of the Krunchy Nut chocolate bars is 70 g with a standard deviation of 2 g. The company produces 3000 bars a day. Assuming a normal distribution:

   a) What percent of the bars will have masses between 68 g and 74 g?

   b) On one day, how many bars will have a mass over 72 g?

   c) On one day, how many bars will have masses between 64 g and 70 g?

   d) What steps should be taken if the standard deviation increases to 10 g?

4. The Acme Paper Company makes rolls of paper towels. The mean length of each roll is 60 m with a standard deviation of 2 m. A grocery store ordered 500 rolls. Assuming a normal distribution:

   a) What percent of the rolls will have lengths between 54 m and 58 m?

   b) How many rolls will be longer than 62 m?

   c) How many rolls will be shorter than 62 m?

5. The City of Blind Canyon did a traffic survey on the street where the high school was located in order to determine whether or not a traffic light should be installed. After clocking 1000 vehicles it was found that the mean speed was 55 km/h with a standard deviation of 4 km/h. Assuming a normal distribution:

   a) What percent of the cars were travelling faster than 51 km/h?

   b) How many vehicles were travelling less than 59 km/h?

   c) How many vehicles were travelling between 53 km/h and 61 km/h?

6. The quality controller at a pharmaceutical company finds that the mean number of vitamin pills in a bottle is 150 with a s.d. of 1. Assuming a normal distribution:

   a) What percent of the bottles contain more than 151 pills?

   b) What percent of the bottles contain between 148 and 152 pills?

   c) How many of the bottles contain less than 149 pills if 100 000 pills are filled in a day?

7. The Department of Health conducted a dental survey of 6000 sixteen-year-old high school students to determine the extent of dental decay. It was found that the mean number of teeth per student affected by decay was 9 with a s.d. of 2. Assuming a normal distribution:

   a) What percent of the students had less than 7 teeth affected by decay?

   b) How many students had more than 11 teeth affected by decay?

   c) How many students had between 7 and 12 teeth affected by decay?

OP.VIII. STATISTICS (STANDARD DEVIATION AND THE NORMAL CURVE) - ANSWERS

1.

Classes	Class Mark x	Tally	f	f·x	$(x - \bar{x})$	$(x - \bar{x})^2$	$f\cdot(x - \bar{x})^2$
2.5 - 58.5	30.5	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 1	46	1403.0	-53.9	2 905.2	133 639.2
58.5 - 114.5	86.5	𝍸 𝍸 𝍸 11	17	1470.5	2.1	4.4	74.8
114.5 - 170.5	142.5	𝍸 111	8	1140.0	58.1	3 375.6	2 700.48
170.5 - 226.5	198.5	1	1	198.5	114.1	13 018.8	13 018.8
226.5 - 282.5	254.5	1111	4	1018.0	170.1	28 934.0	115 736.0
282.5 - 338.5	310.5	1	1	310.5	226.1	51 121.2	51 121.2
338.5 - 394.5	366.5	11	2	733.0	648.6	420 682.0	841 364.0
394.5 - 450.5	422.5		0	0	338.1		0
450.5 - 506.5	478.5	1	1	478.5	394.1	155 314.8	155 314.8
			$\Sigma = 80$	$\Sigma f\cdot x = 6752$			1 337 273.6

$$\bar{x} = \Sigma \frac{f\cdot x}{n} = \frac{6752}{80} = 84.4$$

$$(\text{s.d.})\sigma = \sqrt{\frac{\Sigma f \cdot (x-x)^2}{n}} = \sqrt{\frac{1\ 337\ 273.6}{80}} = \sqrt{16\ 715.92} = \underline{129.3}$$

(Note: This indicates the tremendous variety of closing prices in any given list of stocks on the market. This shows that there is not a normal distribution).

2. $M + \sigma$

3. a) 7%
   b) 16%
   c) 145

4. a) 16%
   b) 6400 boxes
   c) 800 boxes

5. a) 16%
   b) 2%
   c) 82%

6. a) (i) Heights

Classes	Class Mark x	Tally	f	f•x	(x-x̄)	(x-x̄)²	f•(x-x̄)²
172.5 - 175.5	174	~~1111~~ 11	7	1218	- 8.4	70.6	494.2
175.5 - 178.5	177	1111	4	708	- 5.4	29.2	116.8
178.5 - 181.5	180	1111	4	720	- 2.4	5.8	23.2
181.5 - 184.5	183	~~1111~~ ~~1111~~ 111	13	2379	0.6	.4	5.2
184.5 - 187.5	186	1111 11	7	1302	3.6	13.0	91.0
187.5 - 190.5	189	111	3	567	6.6	43.6	130.8
190.5 - 193.5	192	1111	4	768	9.6	92.2	368.8
			Σ = 42	Σ = 7662			Σ = 1230

$$\bar{x} = \frac{\Sigma\ f \cdot x}{n} = \frac{7662}{42} = \underline{182.4}$$

$$\sigma = \sqrt{\frac{\Sigma\ f\ (x-\bar{x})^2}{n}} = \sqrt{\frac{1230}{42}} = \sqrt{29.3}$$

$$= \underline{5.4}$$

(ii) Weights

Classes	Class Mark x	Tally	f	f·x	$(x-\bar{x})$	$(x-\bar{x})^2$	$f\cdot(x-\bar{x})^2$
69.5 - 72.5	71	1	1	71	-13.1	171.6	171.6
72.5 - 75.5	74	1	1	74	-10.1	102.0	102.0
75.5 - 78.5	77	111	3	231	- 7.1	50.4	151.2
78.5 - 81.5	80	1111 1	6	480	- 4.1	16.8	100.8
81.5 - 84.5	83	~~1111~~ ~~1111~~ 111	13	1079	- 1.1	1.2	15.6
84.5 - 87.5	86	1111	5	430	1.9	3.6	18.0
87.5 - 90.5	89	~~1111~~ 1111	9	801	4.9	24.0	216.0
90.5 - 93.5	92	1111	4	368	7.9	62.4	249.6
			42	$\sum = 3534$			$\sum = 1024.8$

$$\bar{x} = \frac{\Sigma\ f\cdot x}{n} = \frac{3534}{42} = \underline{84.1}$$

$$\sigma = \sqrt{\frac{\Sigma\ f\cdot(x-\bar{x})^2}{n}} = \sqrt{\frac{1024.8}{42}} = \sqrt{24.4}$$

$$= \underline{4.9}$$

b) (i) Heights

$M \pm 1\sigma = -5.4 + 182.4 + 5.4$

$177 \longrightarrow 187.8$

Number of players in this range is approximately 28 $\frac{28}{42} + \underline{66.7\%}$

leaving out the class, 187.5 - 190.5

(ii) Weights

$M \pm 1\sigma = -4.9 + 84.1 + 4.9$

approx. $79 \longrightarrow 89$

Number of players is approximately 33
including the 78.5 - 81.5
as well as 87.5 - 90.5

$\frac{33}{42} = 78.6\%$

7. a) 68%
   b) 97.7%
   c) 2%

8. a) 68%
   b) 96%
   c) 84%

9. a) 82%
   b) 84%
   c) 1600
   d) 1600

Review Questions

1. a) 68%
   b) 98%
   c) 160
   d) 20

2. a) 84%
   b) 68% x 2000 = 1360
   c) 40
   d) 320

3. a) 82%
   b) 480
   c) 1491
   d) A variety of answers could be given here, all related to the fact that the company will be losing money and credibility and the fault should be immediately rectified.

4. a) 15.7%
   b) 80
   c) 420

5. a) 84%
   b) 840
   c) 430

6. a) 16%
   b) 97.7%
   c) 16 000

7. a) 16%
   b) 120
   c) 4620